JPPIPA 9(Special Issue) (2023)

Jurnal Penelitian Pendidikan IPA

Journal of Research in Science Education

http://jppipa.unram.ac.id/index.php/jppipa/index

The Effect of RADEC Learning Model on Student Learning Activities and HOTS on Science Learning in Elementary Schools

Deni Okta Nadia[1*], Solfema[2], Yalvema Miaz[1], Ardipal[3]

[1]Basic Education Study Program, Faculty of Education, Padang State University, Padang, Indonesia
[2]Non Formal Education Study Program, Faculty of Education, Padang State University, Padang, Indonesia
[3]Art Education Study Program, Faculty of Language and Arts, Padang State University, Padang, Indonesia

Received: October 20, 2023
Revised: November 29, 2023
Accepted: December 25, 2023
Published: December 31, 2023

Corresponding Author:
Deni Okta Nadia
denioktanadia@gmail.com

DOI: 10.29303/jppipa.v9iSpecialIssue.6702

Abstract: This research was motivated by the low levels of learning activities and higher-order thinking skills (HOTS) among students in science education. The study aims to determine the impact of the RADEC learning model (Read, Answer, Discuss, Explain, and Create) on the learning activities and HOTS of fourth-grade elementary school students. The research design used is experimental research with a Quasi-Experimental design that employs a Non-equivalent Control Group Design. The study's population comprises fourth-grade elementary school students, with class IVA selected as the experimental group and class IVB as the control group at SDN 09 Simpang Tigo, using simple random sampling. The instruments used in this study include questionnaires and tests. Questionnaires assess student learning activities, while tests evaluate students' HOTS. The study results revealed: (1) The Sig value (2-tailed) 0.001 < 0.05. Consequently, H_0 is rejected, and H_1 is accepted, indicating that the RADEC learning model influences student learning activities in social studies in fourth-grade elementary schools. (2) The Sig value (2-tailed) 0.000 < 0.05. Therefore, H_0 is rejected, and H_1 is accepted, demonstrating that the RADEC learning model has an impact on students' HOTS in science education in fourth-grade elementary schools. In conclusion, the study findings suggest that the RADEC learning model significantly influences students' learning activities and high-order thinking skills in science education in fourth-grade elementary schools.

Keywords: Elementary School; HOTS; Learning Activities; RADEC Learning Model

Introduction

The technological advancements of the 21st century have impacted every aspect of life, including education (Mardhiyah et al., 2021). Education is a crucial element in shaping the future of a nation. The curriculum in Indonesia has undergone several changes in response to the rapid changes in the times and the evolving characteristics of students over time. These changes aim to improve the existing education system and find the most effective system to achieve national educational goals (Noor, 2018; Pristiwanti et al., 2022). Currently, the Merdeka Curriculum has been introduced as a new curriculum, utilizing a diverse learning system (Noor, 2018).

The Merdeka Curriculum is designed to elevate the standards of education in Indonesia. One distinctive feature of the Merdeka Curriculum is the integration of Natural Sciences (IPA) and Social Sciences (IPS) into Natural and Social Sciences (IPAS) at the elementary school level (Hasanah et al., 2023; Marwa et al., 2023). The reason behind this integration is that at the

How to Cite:
Nadia, D.O., Solfema, S., Miaz, Y., & Ardipal, A. (2023). The Effect of RADEC Learning Model on Student Learning Activities and HOTS on Science Learning in Elementary Schools. *Jurnal Penelitian Pendidikan IPA*, *9*(SpecialIssue), 364–371. https://doi.org/10.29303/jppipa.v9iSpecialIssue.6702

elementary school age, students tend to view the world in a holistic and integrated manner. They are still in the stage of concrete/simple, holistic, and comprehensive thinking but not yet too detailed (Andreani & Gunansyah, 2023).

In effective IPAS learning, educators must design learning experiences that promote the development of the 4C skills, helping students become critical, creative, communicative, and collaborative thinkers ready to address complex issues in modern society (Prabawati, 2022). If examined further, these skills are closely related to Higher Order Thinking Skills (HOTS).

Higher Order Thinking Skills involve critical thinking skills that help students analyze information deeply and make decisions, while effective communication enables the clear conveyance of complex ideas (Kurnia et al., 2022). In the process of learning these high-level thinking skills, educators must maximize their efforts to ensure the quality of learning. Students should not only understand but also analyze, evaluate, and create (Nurfaidah & Mahardika, 2023). By focusing on in-depth analysis, information synthesis, and evaluation, students become more capable of understanding concepts comprehensively. These skills also stimulate creativity and imagination, helping students generate innovative ideas that are valuable in an ever-changing world.

However, the reality is that the learning activities and higher-order thinking skills of students are still low. In the learning process, students are currently at the stages of remembering, understanding, and applying, while their abilities in analyzing, evaluating, and creating need improvement (Ishlahul et al., 2023). Research suggests that the low level of higher-order thinking skills in students is due to teacher-centered learning. In line with this, (U. Fauziah & Fitria, 2020) also found that during the learning process in the classroom, teachers only use textbooks as a guide, while students passively observe without feedback. This lack of interaction leads to boredom and a loss of motivation among students.

Therefore, there is a need for innovation in the learning process. One effort that can be made is to use a different learning model from before. One suitable learning model for enhancing active participation and honing the higher-order thinking skills of students is the RADEC (Read-Answer-Discuss-Explain-Create) learning model.

The RADEC learning model can stimulate learning activities and improve the higher-order thinking skills of students . This analysis is supported by several studies that have been proven before. Among these studies is the research conducted by (Nurliana & Sukmawati, 2023; Pratama et al., 2020), whose findings indicate that implementing the RADEC learning model positively contributes to the higher-order thinking skills of students, unlike the use of the inquiry learning model.

Expert opinions are reinforced by research conducted by (Tulljanah & Amini, 2021), whose results conclude that the RADEC learning model significantly develops higher-order thinking skills (HOTS) and also strongly supports the create stage in HOTS because creation is the highest level in analytical thinking skills.

Another supporting theory is the research conducted by (Rindiana et al., 2022), whose results show that RADEC, as a learning model, can be an effective alternative to enhance higher-order thinking skills (HOTS) in IPS subjects at the elementary school level. RADEC utilizes HOTS skills such as analysis, evaluation, and creation, making it a suitable method for developing students' HOTS skills.

Based on the information explained earlier, the conclusion that can be drawn is that the RADEC learning model is an effective option for increasing students' activity in learning and improving their higher-order thinking skills. With the RADEC learning model, students will discover their knowledge about learning material. By allowing students to discover on their own, higher-order thinking skills, including analytical, evaluative, and creative skills, will be honed.

The aim of this research is to determine the influence of the RADEC learning model on student learning activities in IPAS learning in the fourth-grade elementary school.

Method

This research employs a quantitative approach, relying on numerical data for analysis. The study utilizes a Quasi-Experimental Design, specifically a nonequivalent control group design. Quasi-Experimental Design is chosen for its suitability in situations where a randomized controlled trial may be impractical or challenging. This design allows for the examination of the effects of the RADEC learning model while considering the practical constraints of the educational setting. Two groups are involved in this design: the experimental group, which receives the RADEC learning model as treatment, and the control group, which undergoes conventional learning without additional treatment (Sugiyono, 2013).

The population of this research comprises all fourth-grade students at SDN Gugus I Kecamatan Sungaipua. Choosing the entire fourth-grade student population at SDN Gugus I Kecamatan Sungaipua ensures a representative sample for drawing meaningful conclusions about the impact of the RADEC learning model on learning outcomes. Probability sampling is used as the sampling method, where each member of the population has an equal chance of being selected as part of the sample (Sugiyono, 2019). The probability sampling technique employed is simple random sampling. The choice of simple random sampling is motivated by its fairness, ensuring that each student in the target population has an equal opportunity to be included in the study, thereby enhancing the generalizability of the findings to the broader population. The selected experimental class is IVA of SDN 09 Simpang Tigo, while the selected control class is IVB of SDN 09 Simpang Tigo.

Research instruments include a questionnaire and a test sheet. The questionnaire evaluates students' learning activities, capturing the nuances of their engagement with the RADEC learning model. The test sheet assesses students' high-order thinking skills (HOTS), providing a comprehensive view of their cognitive abilities.

The data analysis method applied in this research is inferential statistics. Hypothesis testing is conducted after performing prerequisite tests, namely tests for normality and homogeneity. The first and second hypotheses are tested using the t-test, specifically the Independent Samples T-Test.

The decision-making basis for the first hypothesis is as follows: if sig.(2-tailed) > 0.05, then H_0 is accepted, and H_1 is rejected, concluding that there is no influence of the RADEC learning model on students' learning activities. Conversely, if sig.(2-tailed) < 0.05, then H_0 is rejected, and H_1 is accepted, concluding that there is an influence of the RADEC learning model on students' learning activities.

For the second hypothesis, the decision-making basis is: if sig.(2-tailed) > 0.05, then H_0 is accepted, and H_1 is rejected, concluding that there is no influence of the RADEC learning model on students' higher-order thinking skills (HOTS). If sig.(2-tailed) < 0.05, then H_0 is rejected, and H_1 is accepted, concluding that there is an influence of the RADEC learning model on students' HOTS.

Result and Discussion

Acquisition of pretest and posttest data on learning activities and high-order thinking skills reveals differences between the experimental class taught using the RADEC learning model and the control class taught with the conventional model. The details are as follows:

The average pretest score for student learning activities in the experimental class is 63.7, with a minimum score of 53 and a maximum score of 77, and a standard deviation of 6.988. In the control class, the average student learning activity score is 64.94, with a minimum of 52 and a maximum of 77, and a standard deviation of 8.567. Moving on to the posttest data for learning activities, the experimental class has an average score of 83.22, a minimum of 63, a maximum of 95, and a standard deviation of 8.889. In the control class, the average is 73.14, with a minimum of 64, a maximum of 85, and a standard deviation of 6.463.

For high-order thinking skills, the average pretest score in the experimental class is 47.06, with a minimum of 32 and a maximum of 68, and a standard deviation of 811.792. In the control class, the average is 46.82, with a minimum of 28 and a maximum of 68, and a standard deviation of 12.709. Moving to the posttest data for high-order thinking skills, the experimental class has an average score of 82.82, a minimum of 60, a maximum of 96, and a standard deviation of 10.076. In the control class, the average is 63.53, with a minimum of 40 and a maximum of 84, and a standard deviation of 13.920.

The results show that the learning outcomes and skills of students in IPAS classes in the experimental group, using the RADEC model, are higher than those in the control group using the conventional learning model.

Furthermore, based on the N-Gain test calculations, the average student learning activity score in the experimental class using the RADEC learning model is 56.19%, categorized as quite effective. In contrast, the average student learning activity score in the control class using the conventional learning model is 23.29%, categorized as ineffective. Therefore, it can be concluded that the RADEC learning model is quite effective in influencing student learning activities in IPAS education in fourth-grade elementary school.

Similarly, based on the N-Gain test calculations, the average high-order thinking skills score in the experimental class using the RADEC learning model is 69.07%, categorized as quite effective. Meanwhile, the average high-order thinking skills score in the control class using the conventional learning model is 33.48%, categorized as ineffective. Thus, it can be concluded that the RADEC learning model is quite effective in influencing high-order thinking skills in IPAS education in fourth-grade elementary school.

From the explanation above, a clearer view can be seen in the figure 1 dan figure 2.

Next, a normality test was conducted to assess the extent to which the data distribution in both classes follows a normal distribution. Meanwhile, a homogeneity test was performed to ensure the homogeneity of variances between the two classes, which is crucial for maintaining the validity of further analysis.

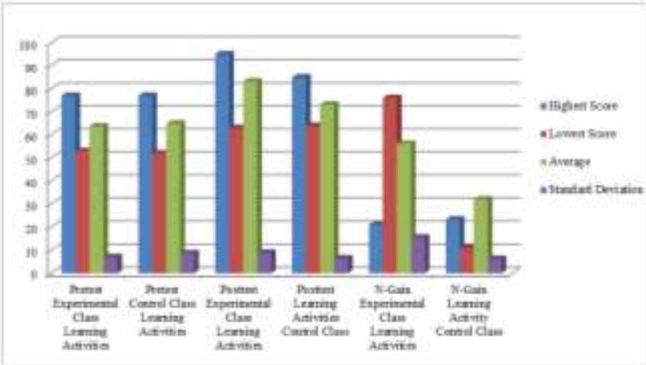

Figure 1. Comparison diagram of pretest, posttest, and N-Gain learning activities in the experimental class and control class

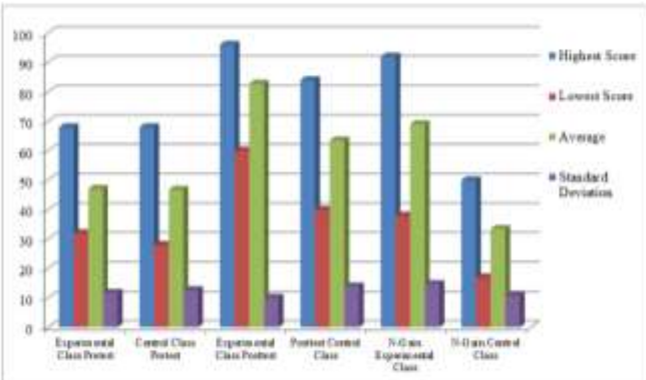

Figure 2. Comparison diagram of pretest, posttest, and N-Gain high-order thinking skills in the experimental class and control class

Table 1. Normality Tests of Student Learning Activities

	Class	Shapiro-Wilk Statistic	df	Sig.
Learning Activities	Experimental Class Pretest	.963	17	.685
	Experimental Class Posttest	.905	17	.082
	Control Class Pretest	.915	17	.121
	Posttest Control Class	.945	17	.383

Based on the SPSS output in Table 1, it is known that the significance (sig) values for the experimental class pretest is 0.685, for the experimental class posttest is 0.082, for the control class pretest is 0.121, and for the control class posttest is 0.383. From these results, it can be observed that all sig values > 0.05, indicating that the student learning activity data in both sample classes can be considered to follow a normal distribution.

Based on the SPSS output in Table 2, it is known that the significance (sig) values for the experimental class pretest is 0.139, for the experimental class posttest is 0.313, for the control class pretest is 0.520, and for the control class posttest is 0.243. From these results, it can be observed that all sig values > 0.05, indicating that the high-order thinking skills data of students in both sample classes can be considered to follow a normal distribution.

Table 2. Normality tests of high-order thinking skills

	Class	Shapiro-Wilk Statistic	df	Sig.
HOTS	Experimental Class Pretest	.918	17	.139
	Experimental Class Posttest	.940	17	.313
	Control Class Pretest	.954	17	.520
	Posttest Control Class	.933	17	.243

Table 3. Homogeneity of student learning activities

		Levene Statistic	df1	df2	Sig.
Learning Activities	Based on Mean	1.076	3	64	.366
	Based on Median	.779	3	64	.510
	Based on Median and with adjusted df	.779	3	53.780	.511
	Based on trimmed mean	1.007	3	64	.396

Based on the SPSS output in Table 3, a significance value of 0.366 was obtained, which is > 0.05, indicating that the student learning activity data in both sample classes has homogeneous variances.

Table 4. Homogeneity of high-order thinking skills

		Levene Statistic	df1	df2	Sig.
HOTS	Based on Mean	1.259	3	64	.296
	Based on Median	.809	3	64	.494
	Based on Median and with adjusted df	.809	3	59.637	.494
	Based on trimmed mean	1.244	3	64	.301

Based on the SPSS output in Table 4.14, a significance value of 0.296 was obtained, which is > 0.05. This means that the high-order thinking skills data of students in both sample classes have homogeneous variances.

The Effect of the RADEC Learning Model on Student Learning Activities

In the first hypothesis of this research, an independent sample t-test was employed. This test was conducted to address the research hypothesis, which posits the influence of the RADEC learning model on student learning activities in the context of Science education (IPAS) in fourth-grade elementary school.

If the significance value (2-tailed) > 0.05, it indicates that there is no significant difference between the pretest results of the experimental class and the control class. However, if the significance value (2-tailed) < 0.05, it implies a significant difference between the pretest results of the experimental class and the control class. The calculation results can be seen in the table below:

Table 5. Independent sample t-test for posttest of student learning activities

		Levene's Test for Equality of Variances		t-test for Equality of Means						
									95% Confidence Interval of the Difference	
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	Lower	Upper
Learning Activities Questionaire	Equal variances assumed	1.210	.279	3.781	32	.001	10.078	2.665	4.649	15.508
	Equal variances not assumed			3.781	29.221	.001	10.078	2.665	4.629	15.528

Based on the output in Table 5, a significance value (2-tailed) < 0.05 was obtained, indicating a significant difference between the posttest results of student learning activities in the experimental class and the posttest results in the control class. This suggests that student learning activities, after being treated with the RADEC learning model, significantly differ from the control class using the conventional learning model.

With these calculation results, H_0 is rejected, and H_1 is accepted, leading to the conclusion that there is an influence of the RADEC learning model on student learning activities in Science education (IPAS) in fourth-grade elementary school.

Learning activities refer to all actions that occur during the interaction between teachers and students, with the aim of achieving learning goals (Lubis et al., 2019). The focus is on the role of students, as through their activities in the learning process, an active learning situation can be created (Darmadi, 2017).

In this study, a questionnaire instrument was used to measure student learning activities. The questionnaire, consisting of 30 statements, was completed by students before and after learning. The influence of the RADEC learning model on student learning activities is determined by the average scores of students in the class treated with the RADEC learning model (experimental) and the average scores of students in the class using the conventional learning model (control). The average scores are then compared to assess how student learning activities in the experimental class compare to those in the control class, as well as to evaluate the improvement in student learning activities.

The results of the data analysis for the first hypothesis reveal that student learning activities in the experimental class using the RADEC learning model are higher than those in the control class using the conventional learning model. This finding aligns with the study conducted by Anggraeni (2023), which states that student learning activities increase when using the RADEC learning model. The improvement is evident in each step of the RADEC learning model applied in the learning process.

This study has demonstrated that the RADEC learning model has an effective influence on student learning activities compared to the conventional learning model. This success is attributed to the RADEC learning model's instructional steps that can encourage student learning activities, making students more active in learning, sharing knowledge, and collaborating to solve problems, thereby creating an enjoyable learning atmosphere for students.

The Influence of the RADEC Learning Model on High-Order Thinking Skills of Students

In the second hypothesis of this research, the same test as the first hypothesis was used, namely the independent sample t-test. This test was conducted to address the research hypothesis, which posits the influence of the RADEC learning model on high-order thinking skills of students in the context of Science education (IPAS) in fourth-grade elementary school.

If the significance value (2-tailed) > 0.05, it indicates that there is no significant difference between the pretest results of the experimental class and the control class. However, if the significance value (2-tailed) < 0.05, it implies a significant difference between the pretest results of the experimental class and the control class. The calculation results can be seen in the table 5.

Based on the output in Table 6, a significance value (2-tailed) < 0.05 was obtained, indicating a significant difference between the posttest results of high-order thinking skills of students in the experimental class and the posttest results in the control class. This suggests that high-order thinking skills of students, after being treated with the RADEC learning model, significantly differ from the control class using the conventional learning model. With these calculation results, H_0 is rejected, and H_1 is accepted, leading to the conclusion that there is an influence of the RADEC learning model on high-order thinking skills of students in Science education (IPAS) in fourth-grade elementary school.

Table 6. Independent sample t-test for posttest of high-order thinking skills

		Levene's Test for Equality of Variances		t-test for Equality of Means						
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference Lower	Upper
HOTS	Equal variances assumed	3.384	.075	4.629	32	.000	19.294	4.168	10.805	27.784
	Equal variances not assumed			4.629	29.156	.000	19.294	4.168	10.772	27.816

High-order thinking skills refer to skills that involve specific ways of thinking, including the ability to analyze, evaluate, and create (Yulisdiva et al., 2023; Zainil et al., 2023). High-order thinking skills play a very significant role in the series of learning and teaching processes (N. Hasanah et al., 2021). In this study, a test instrument was used to measure high-order thinking skills of students. The test consisted of 20 multiple-choice questions answered by students before and after learning. The results of the data analysis for the second hypothesis reveal that high-order thinking skills of students in the experimental class using the RADEC learning model are higher than those in the control class using the conventional learning model. The significant improvement in high-order thinking skills in the RADEC learning model is based on the fact that the syntax of the RADEC learning model is in line with the characteristics of Indonesian students (N. Fauziah & Sukmawati, 2023). The first stage, Read, pays close attention to the needs of students, namely literacy levels, where the level of reading habits is directly proportional to literacy skills . The higher the literacy of an individual, the higher their high-order thinking skills (Fuziani et al., 2021).

Based on the research findings and explanations above, it can be concluded that there is an influence of the RADEC learning model on high-order thinking skills of students in Science education (IPAS) in fourth-grade elementary school. Therefore, the RADEC learning model can be considered as a choice of learning model to be applied to enhance high-order thinking skills of students in learning.

Conclusion

The RADEC learning model has a significant influence on enhancing learning activities and higher-order thinking skills of fourth-grade elementary school students in Natural Sciences (IPAS) classes. The research results indicate that students who participated in learning with the RADEC model achieved a greater improvement compared to those following conventional learning methods. Therefore, the RADEC learning model can be considered an effective alternative for enhancing the quality of education and achieving better learning outcomes at the elementary school level.

Acknowledgments
Thanks to all those who have supported and facilitated the writing of this article. This research ran smoothly thanks to the help of the elementary school, Padang State University, class teachers, validators and peer researchers.

Author Contributions
Conceptualization and methodology, S.; validation, A.; investigation, resources, writing—original draft preparation, D.O.N.; writing—review and editing, Y. A. All authors have read and agreed to the published version of the manuscript.

Funding
This research received no external funding.

Conflicts of Interest
The authors declare no conflict of interest.

References

Andreani, D., & Gunansyah, G. (2023). Persepsi Guru Sekolah Dasar Tentang Mata Pelajaran IPAS Pada Kurikulum Merdeka. *Jurnal Penelitian Guru Sekolah Dasar*, *11*(9), 1841–1854.

Anggraeni, P., Nursyamsyiah, Y., & Akbar, A. (2023). Penerapan Model Pembelajaran Radec untuk Meningkatkan Aktivitas dan Hasil Belajar Siswa Materi Daur Hidup Hewan. *Sebelas April*

Elementary Education, *2*(2), 109–116. https://doi.org/10.21070/PEDAGOGIA.V8I1.1853

Darmadi. (2017). *Pengembangan Model dan Metode Pembelajaran dalam Dinamika Belajar Siswa* (Pertama). Yogyakarta: Deepublish.

Fauziah, N., & Sukmawati, W. (2023). Stacking Analysis of Higher Thinking Skills of Class V Elementary School Students on the Material of Movement Organs Using the RADEC Model. *Jurnal Penelitian Pendidikan IPA*, *9*(7), 5263–5270. https://doi.org/10.29303/jppipa.v9i7.3926

Fauziah, U., & Fitria, Y. (2020). Peningkatan Kemampuan Berpikir Tingkat Tinggi Siswa Sekolah Dasar Melalui Problem-Based Learning. *Primary: Jurnal Pendidikan Guru Sekolah Dasar*, *9*(2), 202–212. https://doi.org/10.33578/jpfkip.v9i2.7881

Fuziani, I., Istianti, T., & Arifin, M. H. (2021). Penerapan Model Pembelajaran Radec dalam Merancang Kegiatan Pembelajaran Keberagaman Budaya di SD Kelas IV. *Jurnal Pendidikan Tambusai*, *5*(3), 8319–8326.

Hasanah, N., Solfema, Syarifuddin, H., & Farida. (2021). Peningkatan Kemampuan Berpikir Kritis dan Kreatif Matematis Siswa Melalui Pendekatan Pembelajaran Berbasis Masalah dengan Software SIDIA. *International Journal of Educational Dynamics*, *3*(1). https://doi.org/https://doi.org/10.24036/ijeds.v3i1.297

Hasanah, O. A., Rifka Amelia, C., Salsabila, H., Agustin, R. D., Setyawati, R. C., Elifas, L., & Marini, A. (2023). Pengintegrasian Kurikulum Merdeka dalam Pembelajaran IPAS. *Jurnal Pendidikan Dasar Dan Sosial Humaniora*, *3*(1), 33–44. https://bajangjournal.com/index.php/JPDSH/article/view/6787

Ishlahul, I., Dwi Haryanti, Y., & Studi Pendidikan Guru Sekolah Dasar, P. (2023). Pengaruh Model Problem Based Learning Terhadap Kemampuan Berpikir Kreatif Siswa pada Pembelajaran IPA. *Papanda Journal of Mathematics and Science Research*, *2*(1), 49–56. https://doi.org/10.56916/PJMSR.V2I1.306

Kurnia, L. D., Haryati, S., & Linda, R. (2022). Pengembangan Instrumen Evaluasi Higher Order Thinking Skills Menggunakan Quizizz Pada Materi Termokimia untuk Meningkatkan Kemampuan Berpikir Tingkat Tinggi Peserta Didik. *Jurnal Pendidikan Sains Indonesia*, *10*(1), 176–190. https://doi.org/10.24815/jpsi.v10i1.21727

Lubis, A. B., Miaz, Y., Taufina, T., & Desyandri, D. (2019). Pengaruh Model Everyone is A Teacher Here Terhadap Aktivitas dan Hasil Belajar IPS Siswa SD. *Jurnal Basicedu*, *3*(2), 725–735. https://doi.org/10.31004/basicedu.v3i2.61

Mardhiyah, R. H., Aldriani, S. N. F., Chitta, F., & Zulfikar, M. R. (2021). Pentingnya Keterampilan Belajar di Abad 21 sebagai Tuntutan dalam Pengembangan Sumber Daya Manusia. *Lectura : Jurnal Pendidikan*, *12*(1), 29–40. https://doi.org/https://doi.org/10.31849/lectura.v12i1.5813

Marwa, N. W. S., Usman, H., & Qodriani, B. (2023). Persepsi Guru Sekolah Dasar Terhadap Mata Pelajaran IPAS Pada Kurukulum Merdeka. *Metodik Didaktik: Jurnal Pendidikan Ke-SD-An*, *2*(18), 54–65.

Noor, T. (2018). Rumusan Tujuan Pendidikan Nasional Pasal 3 Undang-Undang Sistem Pendidikan Nasional No 20 Tahun 2013 Melalui Pendekatan Nilai-Nilai Yang Terkandung Dalam Ayat 30 Surah Ar-Ruum dan Ayat 172 Surah Al-'Araaf. *Universitas Singaperbangsa Karawang*, *2*(01), 123–144.

Nurfaidah, S. S., & Mahardika, L. (2023). Penerapan Model Project Based Learning untuk Meningkatkan Kemampuan Berpikir Tingkat Tinggi Peserta Didik Kelas IV. *Pendas : Jurnal Ilmiah Pendidikan Dasar*, *8*(1), 4832–4844. https://doi.org/10.23969/jp.v8i1.7663

Nurliana, N., & Sukmawati, W. (2023). Stacking Analysis on the Application of the RADEC Model to the Creativity of Fifth Grade Elementary School Students on Water Cycle Material. *Jurnal Penelitian Pendidikan IPA*, *9*(8), 5964–5970. https://doi.org/10.29303/JPPIPA.V9I8.3951

Prabawati, M. A. (2022). Literature Review: Pembelajaran IPA Berbasis Project Based Learning Terintegrasi Terhadap Ketrampilan Abad 21 Sebagai Upaya Realisasi Kurikulum Merdeka. *Prosiding SNPS (Seminar Nasional Pendidikan Sains)*, *0*(0), 105–112. https://jurnal.fkip.uns.ac.id/index.php/snps/article/view/13085

Pratama, Y. A., Sopandi, W., Hidayah, Y., & Trihatusti, M. (2020). Pengaruh model pembelajaran RADEC terhadap keterampilan berpikir tingkat tinggi siswa sekolah dasar. *JINoP (Jurnal Inovasi Pembelajaran)*, *6*(2), 191–203. https://doi.org/10.22219/jinop.v6i2.12653

Pristiwanti, D., Badariah, B., Hidayat, S., & Dewi, R. S. (2022). Pengertian Pendidikan. *Jurnal Pendidikan Dan Konseling (JPDK)*, *4*(6), 7911–7915. https://doi.org/10.31004/JPDK.V4I6.9498

Rindiana, T., Arifin, M. H., & Wahyuningsih, Y. (2022). Model Pembelajaran Radec Untuk Meningkatkan Higher Order Thingking Skill Dalam Pembelajaran Ips Di Sekolah Dasar. *Autentik : Jurnal Pengembangan Pendidikan Dasar*, *6*(1), 89–100. https://doi.org/10.36379/autentik.v6i1.186

Sugiyono. (2013). *Metode Penelitian kuantitatif kualitatif dan R&D*. Bandung: Alfabeta.

Sugiyono. (2019). *Metode Penelitian Pendidikan*. Bandung: Alfabeta.

Tulljanah, R., & Amini, R. (2021). Model Pembelajaran RADEC sebagai Alternatif dalam Meningkatkan Higher Order Thinking Skill pada Pembelajaran IPA di Sekolah Dasar: Systematic Review. *Jurnal Basicedu*, *5*(6), 5508–5519. https://doi.org/10.31004/basicedu.v5i6.1680

Yulisdiva, A., Sodikin, C., & Anggraeni, P. (2023). Perbandingan Model Pembelajaran Read, Answer, Disccus, Explain, And Create (RADEC) dengan Model Pembelajaran Inquiry Terhadap Kemampuan Berpikir Tinggi Siswa pada Materi Gaya. *Jurnal Edukasi Sebelas April (JESA)*, *7*(1), 16–25. https://ejournal.unsap.ac.id/index.php/jesa/article/view/612/272

Zainil, M., Kenedi, A. K., Rahmatina, Indrawati, T., & Handrianto, C. (2023). The influence of a STEM-based digital classroom learning model and high-order thinking skills on the 21st-century skills of elementary school students in Indonesia. *Journal of Education and E-Learning Research*, *10*(1), 29–35. https://doi.org/10.20448/jeelr.v10i1.4336