e-ISSN: 2808-8263
p-ISSN: 2829-0976

Profile of Scientific Attitude of Elementary School Students in RADEC Model Science Learning with the Water Theme

Irfan Jaenudin[1], Ernawulan Syaodih✉[2], Wahyu Sopandi[3], and Atep Sujana[4]

[1,2,3,4] Department of Primary Education, Indonesian University of Education, Bandung

irfanjaenudin@upi.edu; ✉ ernawulansy@upi.edu; wsopandi@upi.edu; atepsujana@upi.edu

Abstract. Scientific attitude is a component that is less attention in science learning in elementary schools and its mastery is still in the low category. This study aims to describe the profile of the scientific attitude of students who learn science by using the RADEC model in the theme of water in elementary schools. This study uses a quantitative descriptive research design with the research subjects were fifth grade of elementary school students. The data collection instrument used in this study was in the form of a scientific attitude questionnaire given to students to find out the scientific attitude profile of students who participated in science learning by using the RADEC model. The results of this study indicated that the profile of students' scientific attitude for curiosity aspect was 74%, the aspect critical thinking attitude was 76%, the aspects of open minded and cooperation were 83%, and the aspects of discovery and creativity were 71%. The average percentage of students' scientific attitude profile in this study for all aspects was 76% or in the good category. It can be concluded that the scientific attitude of students after participating in the RADEC model in learning science had increased and was included in the good category.

Keywords: Scientific Attitude, RADEC Model, Science Learning.

How to Cite: Jaenudin, I., Syaodih, E., Sopandi, W., & Sujana, A. (2022). Profile of Scientific Attitude of Elementary School Students in RADEC Model Science Learning with the Water Theme. *Proceeding The 4th International Conference on Elementary Education, 4*(1), 336-345.

INTRODUCTION ~ Based on its essence, learning Natural Sciences in every school, especially in elementary schools talks about three main things, namely products, processes, and scientific attitudes (Sardinah, Tursinawati, & Noviyanti, 2012). The nature of science, which consists of these three main components, is a characteristic of science learning. If one of these three components is not taught, then the science learning is not complete or has not fully taught the real science.

One important aspect that is often missing in science learning in elementary schools is a scientific attitude that has not been explicitly taught to students. Scientific attitudes still receive less attention in science learning in elementary schools (Sudana, 2018). Scientific attitudes have not been reflected in science learning in elementary schools and are classified in the low category (Kusherawati, Windyariani, & Setiono, 2020; Tursinawati, 2013). Other findings indicate that this low scientific attitude is seen in the science learning process which has not provided opportunities for students to find and apply their own ideas (Ilahi, 2012).

Science learning is dominated by the activities of teachers who teach it through conventional textbooks and occasionally carry out observational activities contained in the book. In addition, learning that does not pay attention to process skills, is oriented to success in answering exam or test questions, learning processes that tend to be rote-

based, and not based on direct experience are factors that cause students' mastery of scientific attitudes to be low (Restami, Suma, & Pujani, 2013; Widiadnyana, Sadia, & Suastra, 2014).

The amount of material and the limited time for learning, make teachers often forget the aspect of inculcating a scientific attitude. Teachers are too focused to pursue the material that needs to be conveyed to students. So to achieve this target, the teacher immediately explained all the concepts in the book because it was seen as easier, faster, and simpler. This condition, which in the end makes science learning in elementary school never complete, because there is one component of the missing nature of science, namely the component of scientific attitude that is not taught to students.

Whereas scientific attitude is an attitude that needs to be possessed by a scientist in conducting the process of investigation or research, for example, such as curiosity, honesty, hard work, unyielding, and open (Tursinawati, 2013). Through inculcating a scientific attitude that is carried out well from an early age, making students have character to become true scientists who can change their principles and accept all differences towards something new (Sudana, 2018). A scientific attitude will also contribute to the ability of students to be sensitive to the surrounding environment, have a high desire to find out everything, and be able to solve environmental problems they face armed with their scientific skills (Tunisa, Kosasih, & Hamdu, 2017).

Given the importance of the role of scientific attitudes in elementary science learning, the problem of the weak component of scientific attitudes must be resolved immediately. One way that can be done to overcome this problem is to improve the learning model applied by the teacher (Restami et al., 2013). Not only that, the learning model used needs to actively involve students to encourage scientific attitudes (Wijayanto & Utomo, 2017). The learning model that encourages this scientific attitude is process-based learning and departs from students' prior knowledge, which can have a positive impact on the formation of students' attitudes and understanding (Sudana, 2018). However, this learning model is also not only able to actively involve students and encourage students' scientific attitudes, but can also be easily understood and applied by teachers in learning that has a large load of subject matter and a short time allocation.

One model that can be used to overcome the problems of this teacher is to apply the RADEC (Read, Answer, Discuss, Explain, and Create) learning model. The RADEC learning model is a Read, Answer, Discuss, Explain, and Create *a learning model* whose names are adjusted to the syntax or *a sequence* of stages of the learning model (Sopandi, 2017). Aspects that can be developed through the implementation of the RADEC model in learning include character, critical thinking, problem solving, *communications*, collaborative, and creative thinking skills (Sopandi, 2019).

The advantages of this model can be seen from the characteristics it has. The characteristics of the RADEC model in learning include: (1) involving students to be active in learning; (2) building the character of independent learners; (3) connecting students' prior knowledge with the material to be studied; (4) is

e-ISSN: 2808-8263
p-ISSN: 2829-0976

contextual; (5) stimulate students to actively ask questions, discuss, propose investigation plans, and conclude the material that has been studied; and (6) facilitating students to be able to study the material in depth through pre-learning assignments (Pratama, Sopandi, & Hidayah, 2019).

Thus, this study aims to describe the profile of students' scientific attitudes using the RADEC model in the water theme science learning in elementary schools. This research becomes necessary to do, considering the scientific attitude as one of the basic components in science learning that can affect the extent to which understanding and science learning outcomes are achieved (Kusuma, Rosidin, & Viyanti -, 2013; Razak & Kamaruddin, 2018)

METHOD

This study uses a descriptive method with a quantitative approach. The aim is to describe the profile of students' scientific attitudes in learning science with the theme of water using the RADEC model in elementary schools. The subjects of this study were students of SD El Fitra Bandung with a population of all fifth grade students at SD El Fitra and a sample of 26 people.

This study tries to apply the RADEC model in science learning to stimulate students' scientific attitudes. The steps of this model consist of: 1) Read to stimulate students' curiosity, 2) Answer stimulate students' curiosity, 3) Discuss stimulates openness and cooperation, 4) Explain stimulates critical attitude, and 5) Create stimulates attitude i*nvention* and creativity. Through the implementation of these steps, it is hoped that there will be an observable increase in scientific attitude.

The procedure for this research was carried out through three stages of activities. The first stage begins with the formulation of the problem, literature review, hypotheses, and research objectives. The formulation of the problem that is the focus of this research is the low scientific attitude of students in learning science in elementary school. Based on the literature review, the researcher found that the application of the RADEC model could be an alternative to the problem that was the focus of this research. Based on this, the objectives of the research to be carried out are formulated. The purpose of this study was to describe the profile of the scientific attitude of elementary school students using the RADEC model in science learning with the theme of water.

The second stage is data collection. The data collection stage is carried out by first determining the population and research sample, then developing the research instrument that will be used. The instrument used in this study was a questionnaire about students' scientific attitudes. Furthermore, this questionnaire was distributed to all students.

The third stage is *a data analysis* and drawing conclusions. The data collected in this study were analyzed using descriptive statistics in the form of percentages. Furthermore, the results of the data analysis are discussed in the form of a description and the results of the discussion are drawn into a research conclusion. The conclusions of the research are the answers to research questions about the profile of the

scientific attitude of elementary school students who learn using the RADEC model in science learning with the theme of water.

The following are the categories of scientific attitude profile measurement used in this study:

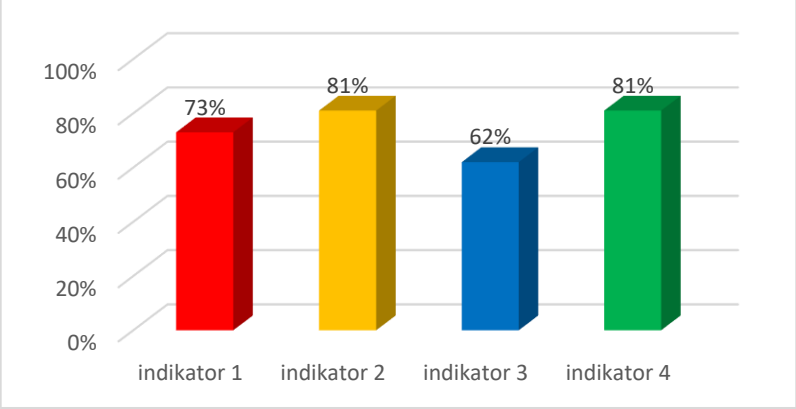
Table 1. Elementary School Student Scientific Attitude Profile Category

Percentage Rate (%)	Category
81 - 100	Excellent
61 – 80	Good
41 – 60	Fair
21 – 40	Poor
≤ 20	Very poor

RESULTS

Data obtained from the results of filling out student questionnaires. This questionnaire instrument is used to measure four aspects of scientific attitudes that have been determined. The aspects of scientific attitude that were measured consisted of: (1) curiosity, (2) critical thinking, (3) openness and cooperation, and (4) discovery and creativity. This data is then analyzed by researchers to determine the profile of the scientific attitude of students who study with the RADEC model.

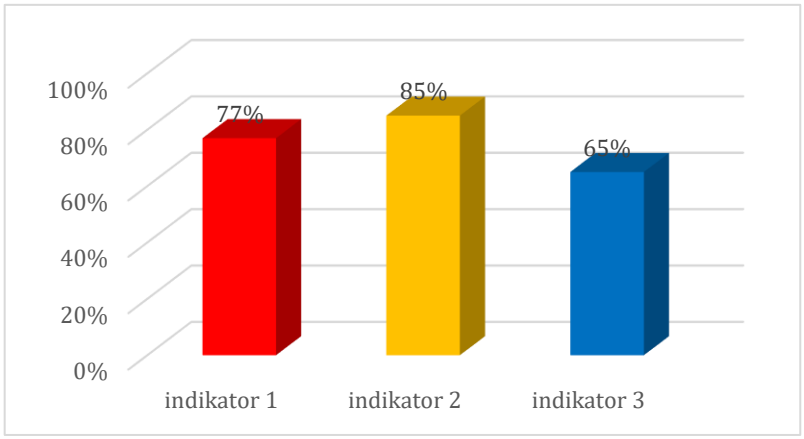
Based on the results of data analysis, it is known that students who study with the RADEC model at *the El Fitra Elementary School* have an average scientific attitude profile that is already good. This can be seen from every aspect of scientific attitude that is measured. The following is a detailed explanation *of* each aspect of the scientific attitude measured by the researcher:



In the aspect of curiosity, students already have a good profile with an average percentage level of 74% for all indicators measured. Indicator 1, enthusiastically seeking answers has a percentage rate of 73% (good). Indicator

e-ISSN: 2808-8263
p-ISSN: 2829-0976

2, attention to the object being observed has a percentage level of 81% (excellent). Indicator 3, enthusiasm for the *scientific* process has a percentage level of 62% (good). Indicator 4, asking for each activity step has a percentage rate of 81% (excellent).



Penyajian Data (*Data Display*)

The aspect of critical thinking attitude has a good profile percentage with a percentage level of 76% for all indicators. Indicator 1, doubting the findings of friends has a percentage rate of 77% (good). Indicator 2, asking for any changes or new things has a percentage rate of 85% (excellent). Indicator 3, repeating the activities carried out has a percentage rate of 65% (good).

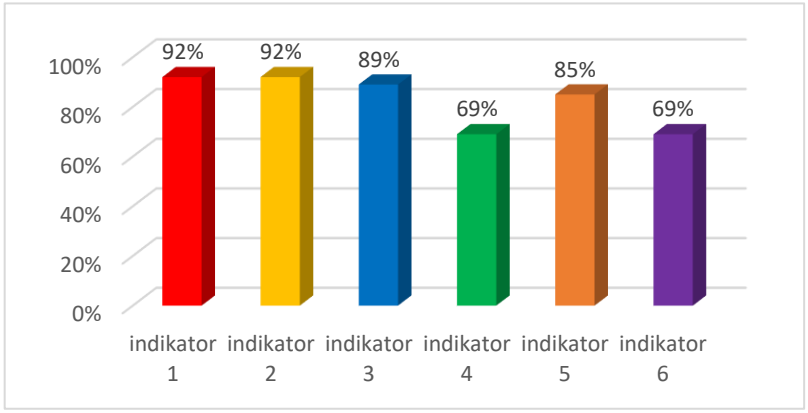


Figure 3. Percentage of Indicators Aspects of Open Attitude and Cooperation

In the aspect of openness and cooperation, the average student already has a very good profile for each indicator. It is proven that the average percentage level for all indicators in this aspect is 83% (excellent). Indicator 1, respecting the opinions or findings of others has a percentage of 92% (excellent). Indicator 2, willing to change *opinion, if* the data lacks a percentage of 92% (excellent). Indicator 3, receiving suggestions from friends has a percentage of 89% (very good). Indicator 4, not feeling always right has a percentage of 69% (good).

Indicator 5, expressing opinions or responses when working in groups has a percentage of 85% (excellent). Indicator 6, actively participating in the group has a percentage of 69% (good).

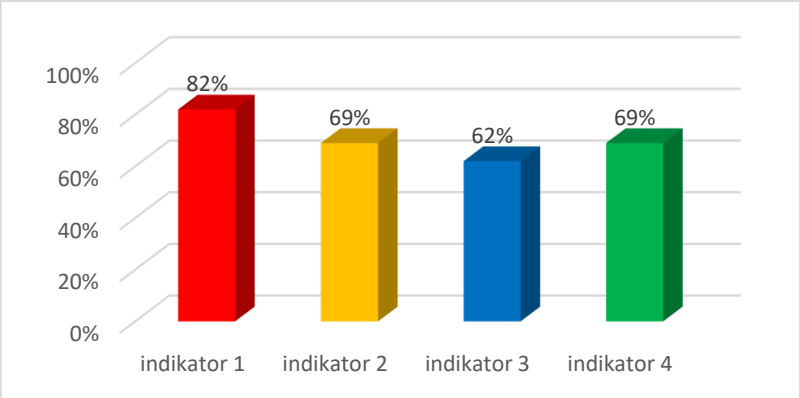


Figure 3. Percentage of Inventions and Creativity Attitudes Indicators

Aspects of the attitude of discovery and creativity have a good percentage of the profile with a percentage level of 71% for all indicators measured in this aspect. Indicator 1 is using facts as the basis for conclusions, which has a percentage of 82% (excellent). Indicator 2 is showing different reports with classmates having a percentage of 69% (good). Indicator 3 is suggesting new trials have a percentage of 62% (good). Indicator 4 is to describe the conclusion that the new observations have a percentage of 69% (good).

Table 2. Profile of the Scientific Attitude of Elementary School Students with the RADEC Model

No.	Aspects of Scientific Attitude	(%)
1.	Curiosity	74
2.	Critical Thinking Attitude	76
3.	Open Attitude and Cooperation	83
4.	Inventions and Creativity Attitudes	71
	Average	76

Based on the data in the table above, it can be seen that the achievement of students' scientific attitudes in every aspect of scientific attitudes measured is in *the well*-very good category. The scientific attitude aspect of the curious attitude is 74% (good). The aspect of critical thinking attitude is 76% (good). The aspect of openness and cooperation is 83% (excellent). Aspects of the attitude of discovery and creativity 71% (good). Then the average percentage of students' scientific attitude profile *in* all aspects of scientific attitude measured is 76% (good). This means that the scientific attitude profile of students who study with the RADEC model in the water theme science learning has a scientific attitude profile that is in the good category.

e-ISSN: 2808-8263
p-ISSN: 2829-0976

DISCUSSION

Based on the research results that have been described previously, it can be seen that students who study with the RADEC model already have a good scientific attitude profile. A good scientific attitude is certainly not something that can be *practiced* obtained, but requires a good learning process. As the results of the study state that one of the factors that influence students' scientific attitudes is the ability of teachers to design learning activities (Rusni, Bahri, & Ristiana, 2020). One effort that can be done is to apply appropriate learning methods or models and can develop a scientific attitude (Rahman, 2017; Restami et al., 2013).

If viewed based on the influence factor, the profile of a good student scientific attitude cannot be separated from the learning design that the teacher applies. In the aspect of curiosity, the student's scientific attitude profile is in the good category. One study stated that the lack of scientific attitude of students was caused by the low scientific background of students (Musyarofah, Hindarto, & Mosik, 2013). This is one of the reasons that affect students' curiosity.

Students with the RADEC model are encouraged to strengthen their scientific background by providing pre-learning questions at the read and answer stage from various sources which are carried out at home. The pre-learning questions given are designed with various levels of contextual questions. Through this model, finally, students who already have sufficient prior knowledge are encouraged to participate actively and contextually link their knowledge *to* the material to be studied (Pratama et al., 2019). With active learning activities, students' attention to the focus of the subject matter increases. With increasing student attention, their curiosity will also increase (Rusni et al., 2020). The design activities in this two-step model (read and answer), finally makes students accustomed to sharpening their curiosity about the material to be studied first.

The second aspect of scientific attitude is critical thinking. In this aspect, the profile of students' critical *thinking, attitudes* shows a percentage level with a good category. As defined, the RADEC model is applied to develop character, critical thinking, problem solving, *communications*, collaborative, and creative thinking skills (Sopandi, 2019). *On* the answer stage, students are trained in their ability to think skeptically and can process information on the expected answers to the pre-learning questions given. *Likewise, at* the discuss stage, students are trained not to easily believe and doubt the answers found by other friends before it is logical to accept them. This is in line with the critical thinking attitude indicator used in previous research, namely the indicator asking for any changes or new things (Kusherawati et al., 2020).

In the aspect of openness and cooperation, it is shown that the profile of students' scientific attitudes for this aspect is in a very good category. This is supported by the steps of the RADEC model at the discuss and explain stage. At these two stages, students are trained to be able to exchange ideas and explain the results of their group work agreements. This can train students to actively participate in learning activities and be open to accepting differences of opinion. This is in line with the research *findings,*

which explain that through group *discussions, students* can play an active role in expressing opinions and listening to the opinions of others, which has a significant effect on scientific attitudes (Kim, 2019).

As for the aspects of the attitude of discovery and creativity, the results of the study show that the profile of students' scientific attitudes in this aspect is in the good category. Through the create stage in the RADEC model, students are encouraged to be able to come up with creative ideas and carry out their creative idea projects. The work of this project is based on observations of environmental phenomena around students. As the characteristics of this model are contextual, linking subject matter with real-life phenomena (Pratama et al., 2019). This is in line with other findings which state that this aspect requires environmental exploration activities to be able to develop students' scientific attitudes (Rusni et al., 2020).

Therefore, students with the RADEC model have a good scientific attitude profile. It is hoped that with this good scientific *aptitude* profile, it can improve student learning outcomes. Many research results prove that students' scientific attitudes have a significant influence on their learning outcomes (Dewi, Agung, & Rati, 2014; Latif, Hasanuddin, & Rusli, 2020; Putri, Idrus, & Yennita, 2017).

CONCLUSION

The results of this study stated that the profile of the scientific attitude of elementary school students with the RADEC model in science learning with the theme of water was in a good category. This is indicated by the average overall scientific attitude of students in the four aspects measured in this study is 76%. The four aspects of scientific attitude consist of curiosity by 74%, critical thinking attitude by 76%, openness and cooperation by 83%, and for discovery and creativity attitude by 71%. The good profile of students' scientific attitudes who study with the RADEC model cannot be separated from the advantages it has. This model *is learning the steps* that equip and strengthen students' prior knowledge of science, contextual, critical, collaborative, and stimulate students to play an active role in building their knowledge. The characteristics of this model have an impact on increasing the profile of students' good scientific attitudes.

ACKNOWLEDGMENTS

Researchers specifically thank the principal, educators, and education staff of SD El Fitra who have participated in carrying out this research activity well.

REFERENCES

Dewi, I. G. A. W. K., Agung, A. A. G., & Rati, N. W. (2014). Hubungan Sikap Ilmiah Dan Motivasi Berprestasi Dengan Hasil Belajar IPA Pada Siswa Kelas V SD Di Gugus II Laksamana Kabupaten Jembrana Tahun Pelajaran 2013/2014. *MIMBAR PGSD Undiksha*, *2*(1), 1–10. https://doi.org/10.23887/jjpgsd.v2i1.3808

Ilahi, M. T. (2012). *Pembelajaran Discovery Strategy & Mental Vocational Skill*. Yogyakarta: DIVA Press.

e-ISSN: 2808-8263
p-ISSN: 2829-0976

Kim, S. (2019). The Effect of Maker Class Emphasizing Small Group Discussion and Debate on Elementary School Students' Science Learning Motivation and Scientific Attitude. *Journal of the Korean Society of Earth Science Education*, *12*, 54–63. https://doi.org/10.15523/JKSESE.2019.12.1.54

Kusherawati, L., Windyariani, S., & Setiono, S. (2020). Profil sikap ilmiah siswa kelas VIII SMP, melalui model pembelajaran guided inquiry laboratory experiment method (gilem). *BIODIK*, *6*(2), 168–175. https://doi.org/10.22437/bio.v6i2.9307

Kusuma, M. D., Rosidin, U., & Viyanti -. (2013). PENGARUH SIKAP ILMIAH TERHADAP HASIL BELAJAR DAN KEMANDIRIAN BELAJAR MELALUI STRATEGI SCAFFOLDING-KOOPERATIF. *Jurnal Pembelajaran Fisika*, *1*(2). Retrieved from http://jurnal.fkip.unila.ac.id/index.php/JPF/article/view/338

Latif, A. R. N., Hasanuddin, H., & Rusli, M. A. (2020). Hubungan Sikap Ilmiah Dengan Hasil Belajar IPA Peserta Didik Kelas VIII SMP Negeri 33 Makassar. *Jurnal IPA Terpadu*, *4*(1), 52–62. https://doi.org/10.35580/ipaterpadu.v4i1.11365

Musyarofah, -, Hindarto, N., & Mosik, -. (2013). Pendidikan Karakter Terintegrasi Dalam Pembelajaran IPA Guna Menumbuhkan Kebiasaan Bersikap Ilmiah. *UPEJ Unnes Physics Education Journal*, *2*(2), 41–48. https://doi.org/10.15294/upej.v2i2.2665

Pratama, Y. A., Sopandi, W., & Hidayah, Y. (2019). RADEC Learning Model (Read-Answer-Discuss-Explain And Create): The Importance of Building Critical Thinking Skills In Indonesian Context. *International Journal for Educational and Vocational Studies*, *1*(2), 109–115. https://doi.org/10.29103/ijevs.v1i2.1379

Putri, A., Idrus, I., & Yennita, Y. (2017). Analisis Korelasi Sikap Ilmiah dan Hasil Belajar Kognitif Siswa Melalui Model PBL. *Diklabio: Jurnal Pendidikan Dan Pembelajaran Biologi*, *1*(1), 1–9. https://doi.org/10.33369/diklabio.1.1.1-9

Rahman, A. (2017). Profil Keterampilan Proses Sains Dan Sikap Ilmiah Siswa di SMP Satu Atap Pulau Tunda. *SCHOOL EDUCATION JOURNAL PGSD FIP UNIMED*, *7*(1), 1–7. https://doi.org/10.24114/sejpgsd.v7i1.6827

Razak, F., & Kamaruddin, R. (2018). Pengaruh Sikap Ilmiah Siswa Terhadap Hasil Belajar Materi Bangun Ruang Siswa Kelas VIII SMP Negeri 3 Minasatene. *Mosharafa: Jurnal Pendidikan Matematika*, *7*(1), 133–142. https://doi.org/10.31980/mosharafa.v7i1.349

Restami, M. P., Suma, K., & Pujani, M. (2013). Pengaruh Model Pembelajaran POE (Predict-Observe-Explaint) Terhadap

Pemahaman Konsep Fisika dan Sikap Ilmiah Ditinjau dari Gaya Belajar Siswa. *Jurnal Pendidikan Dan Pembelajaran IPA Indonesia*, *3*(1), 1–11.

Rusni, R., Bahri, A., & Ristiana, E. (2020). Profil Sikap Ilmiah Siswa Kelas IV SD Inpres Ana Gowa dan SD Negeri Tombolo K. *Sainsmat : Jurnal Ilmiah Ilmu Pengetahuan Alam*, *9*(1), 82–90. https://doi.org/10.35580/sainsmat91141962020

Sardinah, S., Tursinawati, T., & Noviyanti, A. (2012). Relevansi Sikap Ilmiah Siswa Dengan Konsep Hakikat Sains Dalam Pelaksanaan Percobaan Pada Pembelajaran IPA di SDN Kota Banda Aceh. *JURNAL SERAMBI ILMU*, *13*(2), 70–80. https://doi.org/10.32672/si.v13i2.474

Sopandi, W. (2017). The Quality Improvement of Learning Processes and Achievements Through the ReadAnswer-Discuss-Explain-And Create Learning Model Implementation. *Proceeding 8th Pedagogy International Seminar*, 139–146. Kuala Lumpur Malaysia: IPG Khas Kuala Lumpur Press.

Sopandi, W. (2019). Sosialisasi dan Workshop Implementasi Model Pembelajaran RADEC Bagi Guru-Guru Pendidikan Dasar dan Menengah [Dissemination and Implementation Workshop of RADEC Learning Models for Primary and Secondary Education Teachers]. *PEDAGOGIA: Jurnal Pendidikan*, *8*(1), 19–34. https://doi.org/10.21070/pedagogia.v8i1.1853

Sudana, D. (2018). PENGEMBANGAN INSTRUMEN SIKAP ILMIAH UNTUK SISWA SEKOLAH DASAR. *Jurnal Ilmiah Sekolah Dasar*, *2*(2), 144–150. https://doi.org/10.23887/jisd.v2i2.14098

Tunisa, F. R., Kosasih, K., & Hamdu, G. (2017). Pengaruh Model Latihan Penelitian terhadap Sikap Ilmiah Siswa di Sekolah Dasar. *PEDADIDAKTIKA: Jurnal Ilmiah Pendidikan Guru Sekolah Dasar*, *4*(2), 149–157.

Tursinawati, T. (2013). Analisis Kemunculan Sikap Ilmiah Siswa Dalam Pelaksanaan Percobaan Pada Pembelajaran Ipa Di Sdn Kota Banda Aceh. *PIONIR: JURNAL PENDIDIKAN*, *4*(1), 67–84. https://doi.org/10.22373/pjp.v4i1.157

Widiadnyana, I. W., Sadia, I. W., & Suastra, I. W. (2014). Pengaruh Model Discovery Learning Terhadap Pemahaman Konsep IPA dan Sikap Ilmiah Siswa SMP. *Jurnal Pendidikan Dan Pembelajaran IPA Indonesia*, *4*(2), 1–13.

Wijayanto, H., & Utomo, S. B. (2017). Upaya Peningkatan Sikap Ilmiah dan Prestasi Belajar Siswa Melalui Penerapan Project Based Learning (PjBL) Dilengkapi Media Webquest Pada Pembelajaran Kimia Materi Sistem Koloid Kelas XI IPA 2 SMAN Gondangrejo Tahun Pelajaran 2015/2016. *Jurnal Pendidikan Kimia*, *6*(1), 39–45.