

Assessment Instruments of Caring Attitudes and Science Knowledge Competencies IV Grade Elementary School Students

Luh Gede Ayu Rusiana Dewi^{1*}, I Made Gunamantha², I Made Citra Wibawa³ 

^{1,2,3} Basic Education Study Program, Ganehsa University of Education, Singaraja, Indonesia

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ABSTRAK

Sikap kepedulian siswa terhadap lingkungan sekitarnya masih tergolong rendah, hal ini disebabkan karena kurangnya penggunaan instrument penilaian dalam penilaian sikap siswa. Tujuan dari penelitian ini yakni untuk menganalisis rancangan dan menguji kelayakan instrumen sikap peduli dan kompetensi pengetahuan IPA. Penelitian ini tergolong kedalam jenis penelitian pengembangan, dengan menggunakan model pengembangan ADDIE. Subjek yang terlibat dalam penelitian ini yakni 2 orang dosen dan 3 orang guru kelas IV SD. Pengumpulan data dilakukan menggunakan metode studi lapangan, observasi, kuisisioner, dan tes. Data yang diperoleh dalam penelitian ini dianalisis dengan menguji validitas dan reliabilitas instrument. Hasil analisis data menunjukkan bahwa validasi diperoleh rata-rata persentase untuk aspek isi 76,67% (layak), aspek model sains teknologi masyarakat 80% (layak), aspek format 82% (sangat layak), aspek bahasa 93% (sangat layak) dan aspek penyajian 82% (sangat layak). Selanjutnya Uji reliabilitas menunjukkan hasil nilai koefisien reliabilitas untuk instrumen tes dan instrumen kuesioner masing-masing sebesar 0,893 dan 0,939. Nilai ini berada pada rentang $0,80 < r \leq 1,00$, hal ini menunjukkan reliabilitas kedua instrumen yang digunakan dalam penelitian sangat tinggi. Berdasarkan hasil tersebut maka dapat disimpulkan bahwa instrumen penilaian sikap peduli dan kompetensi pengetahuan IPA siswa kelas IV Sekolah Dasar berada pada kategori valid dan reliabel sehingga sangat layak untuk dikembangkan dan digunakan dalam proses pembelajaran.

ABSTRACT

The attitude of students' concern for the surrounding environment is still relatively low, this is due to the lack of use of assessment instruments in assessing student attitudes. The purpose of this study is to analyses the design and tests the feasibility of the instrument of caring attitude and science knowledge competence. This research belongs to the type of development research, using the ADDIE development model. The subjects involved in this study were 2 lecturers and 3 fourth grade elementary school teachers. Data was collected using field study, observation, questionnaire, and test methods. The data obtained in the study were then analyzed by testing the validity and reliability of the instrument. The results of data analysis showed that the validation obtained an average percentage for the content aspect of 76.67% (adequate), the aspect of the social science technology model 80% (adequate), the format aspect 82% (very feasible), the language aspect 93% (very feasible) and 82% presentation aspect (very decent). Furthermore, the reliability test showed the results of the reliability coefficient values for the test instrument and the questionnaire instrument were 0.893 and 0.939, respectively. This value is in the range of $0.80 < r < 1.00$, this shows that the reliability of the two instruments used in this study is very high. Based on these results, it can be concluded that the assessment instrument for caring attitudes and science knowledge competencies are valid and reliable category so that it is very feasible to be developed and used in the learning process.

1. INTRODUCTION

Education is one aspect of life that must be carried out by every component of society. Through education a person will be able to improve the quality of his life and can be well received in society (Fitri, 2021; Pane & Dasopang, 2017). In Indonesia itself, every community is required to take 12 years of

education with the aim of increasing the integration of education, especially in changing student behavior which makes students as the subject of learning (Hermanto, 2020; Prasetya, 2020). In addition, education is also carried out to increase knowledge and develop potential according to the experience gained by students, in accordance with the application of the noble values of Pancasila (Hendriana & Jacobus, 2017; Irawan, 2020; Komara, 2018). Changes in behavior in the learning process will occur if there is a change in the attitude dimension (Büyükkarci, 2014; Raharjo, 2018). This then shows that the implementation of education in Indonesia does not only focus on developing students' cognitive abilities but also emphasizes on developing students' caring attitudes towards their environment.

A caring attitude is an attitude shown by someone in the form of actions or efforts to prevent things that can hurt the order of life or the environment (Afrianda et al., 2019; Sujana & Hariyadi, 2018). The formation of a caring attitude in students can be done through the learning process in the classroom, one of which is in science learning. Science studies various aspects related to nature and its problems with the scope of living things, their energy and changes, the earth and the universe, the processes of matter and their properties (Nugroho & Airlan, 2020; Wulandari, 2017). The purpose of implementing science learning is to increase students' awareness of the environment and themselves, which has the implication of making students more sensitive to various existing problems and able to find the best solution to overcome these problems (Anazifa & Djukri, 2017; Juliartini & Arini, 2017; Narut & Supradi, 2019; Wardani & Syofyan, 2018).

However, in reality the attitude of students' concern is still relatively low, this is indicated by the results of observations at SD Negeri 9 Padangsembian. The results of the observations show that many students still ignore the plants around the school environment, students throw garbage out of place and lack of knowledge and awareness of students to sort organic and non-organic waste. The low attitude of students' environmental awareness is due to the absence of a special instrument to measure students' caring attitude. Students' caring attitude cannot be effectively measured if it is not based on knowledge of the value of the surrounding environment. The use of attitude assessment instruments used by teachers is generally still limited in the form of small notes without any special instruments used to assess student attitudes, such as observation sheets, self-assessment sheets or assessment sheets between friends. This of course has an impact on the lack of caring attitudes of students so that the knowledge competence of students also decreases.

One of the efforts that can be done to overcome these problems is by developing an assessment instrument for caring attitudes and the competence of students' science knowledge. Assessment is basically a systematic and continuous process or activity to collect information about the process and learning outcomes of students in order to make decisions based on certain criteria and considerations (Kurniawati & Mawardi, 2021; Mustafa & Masgumelar, 2022). To realize student success in learning, we need a quality learning and the use of appropriate instruments so as to facilitate students to achieve the learning objectives that have been planned (Sinaga, 2020; Widowati et al., 2017). The assessment instrument will make it easier for teachers to provide an assessment of the attitudes shown by students and the values shown are objective in accordance with student behavior patterns (Apriyana et al., 2019; Ramdani et al., 2019; Soeharto et al., 2019).

Several studies that have been conducted previously revealed that the attitude assessment instrument developed was feasible, valid and reliable to be applied in the learning process (Apriyana et al., 2019; Mustafa & Masgumelar, 2022). Other research reveals that the social attitude assessment instrument developed is very feasible to be developed and used in thematic learning of third grade elementary school students (Kuntoro & Wardani, 2020). The results of further research revealed that the social responsibility attitude assessment instrument was valid and reliable so that it was feasible to use (Radia & Aulia, 2021). Based on some of the results of these studies, it can be said that the caring attitude instrument developed is in the valid category and is very feasible to be developed. It's just that in previous studies there has been no research that focuses on developing an assessment instrument for caring attitudes and science knowledge competencies for fourth grade elementary school students. So, this research is focused on the study with the aim of analyses the design and testing the feasibility of the student caring attitude instrument and the science knowledge competence of fourth grade elementary school students.

2. METHOD

This research belongs to the type of development research carried out using the ADDIE (Analysis-Design-Development-Implementation-Evaluation). At each stage of development a revision process is carried out to ensure the feasibility of the instrument. At the analysis stage, the needs analysis process, curriculum analysis and character analysis of students are carried out. Furthermore, at the design stage, it

is carried out to design the instruments that will be used in research to match the Basic Competencies and indicators and based on the reference to the development of questions in the assessment instrument to students. At the development stage, the instruments to be validated are content and constructs by experts (expert lecturers and teachers) so that the instruments made can be said to be valid and can be used in development research. The implementation stage is the application of a learning system or assessment instrument that is being made. So that at the implementation stage, the use of product development activities is carried out in the form of an environmental care attitude assessment instrument and science knowledge competence. The final stage of the research is the evaluation stage, which is a process to see the attitudes and abilities of students in the learning process by using an assessment instrument for caring attitudes and science knowledge competencies.

The subjects involved in this study were 2 lecturers and 3 grade IV teachers at the State 9 Padangsembian elementary school. The object of this development research is the instrument of caring attitude and science knowledge competence which is used to measure the caring attitude and competence of the fourth-grade students of State Elementary School 9 Padangsembian. Data was collected using field study, observation, questionnaire, and test methods. The data obtained in the study were then analyzed by testing the validity and reliability of the caring attitude instrument and the science knowledge competency instrument by means of an analysis of the validation sheet that had been distributed to five experts. The validity test consists of 2 parts, namely the content validity of the test and the validation of the test items using the biserial point-correlation formula.

The basis for decision making uses a significance level of 5%, if r is positive, then the item is declared valid. This means that there is a significant correlation between the item scores and the total score. Meanwhile, if r is negative, then the item is declared invalid. This means that there is no significant correlation between the item scores and the total score. Reliability was tested on both instruments, namely the caring attitude instrument and science knowledge competence. The science competence instrument was tested for reliability using the KR-20 formula. The criteria for qualifying the reliability coefficient with KR-20 are presented in Table 1.

Table 1. Qualification Criteria for Instrument Reliability Competency Science Knowledge

Criteria	Qualification
$0,0 < r_{tt} \leq 0,2$	Very low test reliability
$0,2 < r_{tt} \leq 0,4$	Low test reliability
$0,4 < r_{tt} \leq 0,6$	Medium test reliability
$0,6 < r_{tt} \leq 0,8$	High test reliability
$0,8 < r_{tt} \leq 1$	Very high test reliability

The caring attitude instrument was tested for reliability using Cronbach's Alpha coefficient. The qualification criteria for the reliability coefficient with Cronbach's Alpha are presented in Table 2.

Table 2. Qualification Criteria for the Reliability of the Caring Attitude Instrument

Criteria	Qualification
$0,0 < r_{tt} \leq 0,2$	Very low test reliability
$0,2 < r_{tt} \leq 0,4$	Low test reliability
$0,4 < r_{tt} \leq 0,6$	Medium test reliability
$0,6 < r_{tt} \leq 0,8$	High test reliability
$0,8 < r_{tt} \leq 1$	Very high test reliability

3. RESULT AND DISCUSSION

Result

The results of this study are in the form of an assessment instrument developed using the ADDIE model in the form of a questionnaire and a science knowledge competency instrument developed in the form of questions. The results of the research using the ADDIE model in the following 5 stages: the analysis stage, the results of observations and interviews with teachers indicate that the caring attitude instrument is not developed in the school because the school is currently still focused on developing

hybrid learning, namely a combination of online and offline learning. And the other aspects are ruled out and only rely on the guidelines given by the Ministry of Education and Culture to schools. After conducting the analysis stage, the research then continued at the design stage which produced a caring attitude questionnaire instrument and a science knowledge competency test for fourth grade elementary school students based on the theoretical basis and relevant articles.

The third stage is the development stage, which produces inputs from five experts (2 lecturers and 3 teachers at SD Negeri 9 Padangsembian) regarding the feasibility of the instrument so that researchers are able to improve the developed instrument for the better. The five experts stated that the caring attitude instrument (35 questions) and science knowledge competence (30 questions) were declared feasible so that the instrument could be tested and implemented in state elementary school 9 Padangsembian. In the fourth stage, namely the implementation stage, a trial was carried out on fourth grade students of state elementary school 9 Padangsembian as the object of this research which will produce an output in the form of a response from the student so that it can be continued to the evaluation stage. The final stage in this research is the evaluation stage, which results in an evaluation of the instruments developed in this study. The evaluation carried out is to test the validity and reliability of the caring attitude instrument and science knowledge competence.

The instrument's feasibility test was conducted by testing the validity using point-biserial correlation. The validity test uses biserial-point correlation with the decision-making criteria if the value of $r_{count} > r_{table}$ then, the statement item is declared valid. But, if the r_{count} value $< r_{table}$ the statement item is declared invalid. The r_{table} value on the knowledge instrument for the number of respondents as many as 30 people with $df = 30 - 2 = 28$ and $\alpha = 5\%$ is 0.374. Based on the analysis, the results are obtained in Table 3.

Table 3. Knowledge and Attitude Instrument Validity Test Results

Knowledge		Attitude	
Valid Question Items	Invalid Question Items	Valid Question Items	Invalid Question Items
1,2,5,6,7,8,10,12,13,15,16,17,18,19,20,21,22,23,24,25,26,27,28,29,30	3, 4, 9, 11, 14	1,2,3,4,5,6,7,8,9,10,11,12,13,15,16,17,18,19,20,21,22,23,24,25,26,27,28,29,30,31,32,33,34,35	-

Based on Table 3, the knowledge instrument was obtained that from 30 items there were 5 items that were not valid namely, item numbers 3, 4, 9, 11 and 14. Meanwhile, the remaining 25 items were declared valid. For the attitude instrument, it was found that of the 35 questions, all of them were declared valid. This is because the r_{count} for each question item is greater than the r_{table} . After obtain the results of the validity test then continued on testing the reliability of the knowledge and attitude instruments. Instrument reliability is calculated only for items that are declared valid. Furthermore, the reliability coefficient that has been obtained from the analysis results using the KR-20 formula for the test instrument and Cronbach's Alpha formula for the questionnaire instrument. The results of the reliability coefficient values for the test instrument and the questionnaire instrument are 0.893 and 0.939 respectively. This value is in the range of $0.80 < r < 1.00$, this shows that the reliability of the two instruments used in this study is very high. Furthermore, after the two instruments were made based on indicators of caring attitude and competence in science skills, the two instruments were tested by five experts consisting of 2 lecturers and 3 teachers at state elementary school 9 Padangsembian. Based on the results of the analysis of the five experts, it was found that all statement items in the instrument including the caring attitude instrument and science knowledge competence were feasible and could be tested at state elementary school 9 Padangsembian. After the data is collected, then the data is processed to be evaluated to determine the feasibility and effectiveness of the caring attitude instrument and science knowledge competence.

The feasibility of an instrument can be seen from the results of its validity and reliability. Based on the results of the Pearson Product Moment validity test for science knowledge competence, it was found that from 30 questions there were 5 items that were not valid, namely, item numbers 3, 4, 9, 11 and 14. Meanwhile, the remaining 25 items were declared valid. The invalid questions are dropped so they will no longer be used. Based on the results of the Pearson Product Moment validity test for the caring attitude instrument, it was found that all of the 35 questions were declared valid. This is because the r_{count} for each question item is greater than the r_{table} . Based on the results of the validation data analysis, the average percentage for the content aspect is 76.67% (feasible), the social science technology model aspect is 80% (feasible), the format aspect is 82% (very feasible), the language aspect is 93% (very feasible) and

presentation aspect 82% (very feasible). Furthermore, the reliability test was carried out using Alpha Cronbach, based on the results of Alpha Cronbach's Science Knowledge Competence and Caring Attitude Instruments, it was found that the results of the reliability coefficient values for the test instrument and the questionnaire instrument were 0.893 and 0.939, respectively. This value is in the range of $0.80 < r < 1.00$, this shows that the reliability of the two instruments used in this study is very high.

Discussion

The results of the analysis show that the second instrument developed is valid and reliable, this is caused by several factors, including: first, the student assessment instrument can measure the students' caring attitude towards the surrounding environment. The development and formulation of the instrument is carried out by referring to the signs for the preparation of the student's social attitude assessment instrument (Mawardi, 2019; Muftakim & Hardini, 2021). The research instrument will be declared valid if it has been able to objectively assess students and can prove the learning objectives and abilities (competencies) have been truly mastered and achieved (Nuroniyah, 2018; Yusup, 2018). Through the use of instruments, it will make teachers easier to assess students, instruments helps teachers to collect information about the process and learning outcomes of students in order to make decisions based on certain criteria and considerations (Apriyana et al., 2019; Sinaga, 2020). In addition, the instrument also serves to facilitate students in achieving the planned learning objectives (Radia & Aulia, 2021; Wahyuni et al., 2019).

The second supporting factor for success is the instrument for assessing the attitude of caring and the competence of students' science knowledge is practical which makes it easy for teachers to use and understand. Instrument development is an effort made in compiling an assessment instrument based on an analysis of the needs of teachers and students (Mustafa & Masgumelar, 2022; Nugroho & Airlan, 2020). An instrument is said to be good if it meets three conditions, namely validity, reliability, and visibility (Apriyana et al., 2019; Kuntoro & Wardani, 2020). Valid instrument items that have been presented in accordance with student activities in daily life, coverage contain of material, and represents basic competencies. In addition, the definition of attitude as a measuring object is considered very suitable for the product being developed because it has met the validity requirements.

The results obtained in this study are in line with the results of previous studies which also revealed that the attitude assessment instrument developed was feasible, valid and reliable to be applied in the learning process (Apriyana et al., 2019). Other research reveals that the social attitude assessment instrument developed is very feasible to be developed and used in thematic learning of third grade elementary school students (Kuntoro & Wardani, 2020). The results of further research revealed that the social responsibility attitude assessment instrument was valid and reliable so that it was feasible to use (Radia & Aulia, 2021). Based on some of the results of these studies, it can be said that the caring attitude instrument developed is in the valid category and is very feasible to be developed. The implication of this research is to produce a product in the form of a valid and reliable assessment instrument for caring attitudes and science knowledge competencies for fourth grade elementary school students. The results of the development of the assessment instrument for caring attitudes and science knowledge competence can be used as a reference for assessment for educators in schools and are expected to contribute to development in the field of science. In addition, the assessment instrument for caring attitudes and science knowledge competence can be used as a complementary reference for other researchers who want to develop similar instruments.

4. CONCLUSION

Based on the results of the research and discussion, it can be concluded that the assessment instrument for caring attitudes and science knowledge competencies for fourth grade elementary school students is in the valid and reliable category so that it is very feasible to be developed and used in the learning process. Suggestions that can be given based on the results of this research and development are the results of the research can be used as a reference for teachers in teaching material in grade IV SD which refers to caring attitudes as part of character education.

5. REFERENCES

- Afrianda, R., Yolida, B., & Marpaung, R. R. (2019). Pengaruh Program Adiwiyata Terhadap Literasi Lingkungan dan Sikap Peduli Lingkungan. *Jurnal Bioterdidik*, 7(1), Hal. 32-42. <http://jurnal.fkip.unila.ac.id/index.php/JBT/article/view/17117>.

- Anazifa, R. D., & Djukri. (2017). Project- based learning and problem- based learning: Are they effective to improve student's thinking skills? *Jurnal Pendidikan IPA Indonesia*, 6(2), 346-355. <https://doi.org/10.15294/jpii.v6i2.11100>.
- Apriyana, A., Hasyim, A., & Sabdaningtyas, L. (2019). Pengembangan Instrumen Penilaian Sikap Sosial Pada Pembelajaran Tematik Subtema Ayo Cinta Lingkungan. *Jurnal Pedagogi*, 1(1). <http://jurnal.fkip.unila.ac.id/index.php/pgsd/article/view/17504>.
- Büyükkarci, K. (2014). Assessment Beliefs and Practices of Language Teachers in Primary Education. *International Journal of Instruction*, 7(1), 107-120. <https://dergipark.org.tr/en/pub/eiji/issue/5136/69989>.
- Fitri, S. F. N. (2021). Problematika Kualitas Pendidikan di Indonesia. *Jurnal Pendidikan Tambusai*, 5(1), 1617-1620. <https://www.jptam.org/index.php/jptam/article/view/1148>.
- Hendriana, E. C., & Jacobus, A. (2017). Implementasi Pendidikan Karakter Di Sekolah Melalui Keteladanan Dan Pembiasaan. *JPDI (Jurnal Pendidikan Dasar Indonesia)*, 1(2). <https://doi.org/10.26737/jpdi.v1i2.262>.
- Hermanto, B. (2020). Perekayasa sistem pendidikan nasional untuk mencerdaskan kehidupan bangsa. *FOUNDASIA*, 11(2). <https://doi.org/10.21831/foundasia.v11i2.26933>.
- Irawan, A. D. (2020). Nationalism in a State Based on Pancasila. *Petita: Jurnal Kajian Ilmu Hukum Dan Syariah*, 5(2), 133-144. <https://doi.org/10.22373/petita.v5i2.85>.
- Juliartini, N. M., & Arini, N. W. (2017). Penerapan Model Pembelajaran Nht Untuk Meningkatkan Hasil Belajar Ipa Siswa Kelas III. *Journal of Education Action Research*, 1(3), 240. <https://doi.org/10.23887/jear.v1i3.12688>.
- Komara, E. (2018). Penguatan Pendidikan Karakter dan Pembelajaran Abad 21. *SIPATAHOENAN: South-East Asian Journal for Youth, Sports & Health Education*, 4(1), 17-26. <https://doi.org/https://doi.org/10.2121/sip.v4i1.991>.
- Kuntoro, B. T., & Wardani, N. S. (2020). Pengembangan Instrumen Penilaian Sikap Sosial Pembelajaran Tematik Kelas III SD. *Jurnal Ilmiah Wahana Pendidikan*, 6(2), 163-175. <https://doi.org/10.5281/zenodo.3752471>.
- Kurniawati, D., & Mawardi. (2021). Pengembangan Instrumen Penilaian Sikap Gotong Royong dalam Pembelajaran Tematik di Sekolah Dasar. *Jurnal Ilmu Pendidikan*, 3(3), 640-648. <https://doi.org/10.31004/edukatif.v3i3.387>.
- Mawardi, M. (2019). Rambu-rambu Penyusunan Skala Sikap Model Likert untuk Mengukur Sikap Siswa. *Scholaria: Jurnal Pendidikan Dan Kebudayaan*, 9(3), 292-304. <https://doi.org/10.24246/j.js.2019.v9.i3.p292-304>.
- Muftakim, H., & Hardini, A. T. A. (2021). Pengembangan Instrumen Penilaian Sikap Sosial Aspek Kerja Sama Pembelajaran Tematik Kelas IV SD. *Jurnal Ilmiah Wahana Pendidikan*, 7(4). <https://doi.org/https://doi.org/10.5281/zenodo.5150347>.
- Mustafa, P. S., & Masgumelar, N. K. (2022). Pengembangan Instrumen Penilaian Sikap, Pengetahuan, dan Keterampilan dalam Pendidikan Jasmani. *Biormatika : Jurnal Ilmiah Fakultas Keguruan Dan Ilmu Pendidikan*, 8(1), 31-49. <https://doi.org/10.35569/biormatika.v8i1.1093>.
- Narut, Y. F., & Supradi, K. (2019). Literasi sains peserta didik dalam pembelajaran ipa di indonesia. *Jurnal Inovasi Pendidikan Dasar*, 3(1), 61-69. <http://jurnal.unikastpaulus.ac.id/index.php/jipd/article/view/214>.
- Nugroho, A. N., & Airlan, G. . (2020). Pengembangan Instrumen Penilaian Keterampilan Berpikir Kritis Pembelajaran IPA Kelas 4 SD. *Jurnal Ilmiah Pendidikan Profesi Guru*, 3(3), 400-407. <https://ejournal.undiksha.ac.id/index.php/JIPPG/article/view/29712>.
- Nuroniyah, S. (2018). Pengembangan instrumen pengukuran sikap tanggung jawab siswa madrasah aliyah. *Wiyata Dharma: Jurnal Penelitian Dan Evaluasi Pendidikan*, 6(2), 134. <https://doi.org/10.30738/wd.v6i2.3392>.
- Pane, A., & Dasopang, M. D. (2017). Belajar Dan Pembelajaran. *FITRAH:Jurnal Kajian Ilmu-Ilmu Keislaman*, 3(2), 333. <https://doi.org/10.24952/fitrah.v3i2.945>.
- Prasetya, B. (2020). Manajemen Teaching Factory Pada Era Industri 4 . 0 di Indonesia. *Jurnal Bisnis & Teknologi*, 12(01), 12-18. <http://45.118.112.109/ojspasim/index.php/jbt/article/view/195>.
- Radia, E., & Aulia, W. (2021). Pengembangan Instrumen Penilaian Sikap Tanggung Jawab Pembelajaran Tematik Terpadu Kelas V SD. *MIMBAR PGSD Undiksha*, 9(1), 10. <https://doi.org/10.23887/jjgsd.v9i1.32979>.
- Raharjo, S. B. (2018). Evaluasi Trend Kualitas Pendidikan Di Indonesia. *Jurnal Penelitian Dan Evaluasi Pendidikan*, 16(2), 511-532. <https://doi.org/10.21831/pep.v16i2.1129>.

- Ramdani, A., Jufri, A. W., Gunawan, G., Hadisaputra, S., & Zulkifli, L. (2019). Pengembangan Alat Evaluasi Pembelajaran Ipa Yang Mendukung Keterampilan Abad 21. *Jurnal Penelitian Pendidikan IPA*, 5(1). <https://doi.org/10.29303/jppipa.v5i1.221>.
- Sinaga, R. (2020). Pengembangan Instrumen Penilaian Sikap Mahasiswa PG-PAUD FIP Unimed dalam Pembelajaran Daring. *Jurnal Usia Dini*, 6(2), 1. <https://doi.org/10.24114/jud.v6i2.22187>.
- Soeharto, Csapó, B., Sarimanah, E., Dewi, F. I., & Sabri, T. (2019). A review of students' common misconceptions in science and their diagnostic assessment tools. *Jurnal Pendidikan IPA Indonesia*, 8(2), 247–266. <https://doi.org/10.15294/jpii.v8i2.18649>.
- Sujana, K., & Hariyadi, S. (2018). Hubungan Antara Sikap Dengan Perilaku Peduli The Relation Between Environmental Care Attitude And Behavior In. *Jurnal Ecopsy*, 5(2), 81–87. <https://scholar.archive.org/work/kffzmbwgdvg65hloyuwtfhineu/access/wayback/https://ppjp.ulm.ac.id/journal/index.php/ecopsy/article/download/5026/pdf>.
- Wahyuni, G., Ibnu, S., & Suharti, S. (2019). Perbedaan Pemahaman Konsep Siswa sebagai Hasil Penerapan Model Pembelajaran LC 5E-Analogi dan LC 5E. *Jurnal Pendidikan: Teori, Penelitian, Dan Pengembangan*, 4(4), 537. <https://doi.org/10.17977/jptpp.v4i4.12361>.
- Wardani, R. K., & Syofyan, H. (2018). Pengembangan Video Interaktif pada Pembelajaran IPA Tematik Integratif Materi Peredaran Darah Manusia. *Jurnal Ilmiah Sekolah Dasar*, 2(4), 371. <https://doi.org/10.23887/jisd.v2i4.16154>.
- Widowati, A., Nurohman, S., & Anjarsari, P. (2017). Developing science learning material with authentic inquiry learning approach to improve problem solving and scientific attitude. *Jurnal Pendidikan IPA Indonesia*, 6(1), 32–40. <https://doi.org/10.15294/jpii.v6i1.4851>.
- Wulandari, R. (2017). Berpikir Ilmiah Siswa dalam Pembelajaran IPA Untuk Meningkatkan Literasi Sains. *SEJ (Science Education Journal)*, 1(1), 29–35. <https://doi.org/10.21070/sej.v1i1.839>.
- Yusup, F. (2018). Uji Validitas dan Reliabilitas Instrumen Penelitian Kuantitatif. *Jurnal Tarbiyah : Jurnal Ilmiah Kependidikan*, 7(1). <https://doi.org/10.18592/tarbiyah.v7i1.2100>.