Investigating the Effect of Authentic Research Project-Based Laboratory Work on Creative Thinking, Attitudes and Scientific Work Skills of High School Students

by Aa Sukarso Dkk

Investigating the Effect of Authentic Research Project-Based Laboratory Work on Creative Thinking, Attitudes and Scientific Work Skills of High School Students

A. A. Sukarso[1](✉), Ari Widodo[2], Diana Rochintaniawati[2], and Widi Purwianingsih[2]

[1] Biology Education Study Program, University of Mataram, Mataram, Indonesia
asukarso@unram.ac.id

[2] Biology Education Department, Universitas Pendidikan Indonesia, Bandung, Indonesia

Abstract. This study aims to reveal the effectiveness of the authentic research project-based laboratory work to develop creative thinking skills, scientific attitudes, and students' scientific work skills in high school biology learning. The 34 students of class X MIPA from one of the public high schools in Mataram, West Nusa Tenggara Indonesia, carried out authentic research project-based laboratory work and 34 other students with verification laboratory work. Creative thinking skills were assessed using a creative thinking skills test compiled by researchers. Tests were administered before and after the intervention. Scientific attitude is assessed using the observation method, and scientific workability is assessed using self and peer assessment instruments. The results showed that the authentic research project-based laboratory work encourages creative thinking skills, stimulates scientific attitudes and students' scientific work abilities. This study concludes that the authentic research project-based laboratory work provides insight into how the authentic research project-based laboratory work encourages creative thinking, shows benefits in instilling scientific attitudes, improves students' scientific workability, and the limitations of the approach in this study.

Keywords: Effect of authentic research project-based laboratory work · creative thinking · attitudes · scientific work skills

1 Introduction

The life of the 21st century requires a person to master various skills. Each individual is required to have the ability to think creatively, solve problems and cooperate to overcome complex life challenges [1]. Creative thinking skills are very important to be developed in the 21st century [2]. Mastery of 21st-century skills can be done by updating learning quality, including developing student-centred learning [3]. The training learning experience must equip students to become individuals who have collaborative, communicative, and creative abilities [4].

M. L. Firdaus and A. Defianti (Eds.): MASEIS 2021, ASSEHR 718, pp. 3–12, 2023.
https://doi.org/10.2991/978-2-38476-012-1_2

The education system should give more priority to developing creative thinking. The use of active learning strategies is effective in promoting creative thinking [5]. A pedagogical approach that develops interaction and gives autonomy to students encourages the emergence of responsibility and increases knowledge retention for the long term [6], and improves creative thinking skills [7, 8]. Creative thinking's are obtained from the interaction between talents, processes, and a mutually supportive environment [9]. These are ways of thinking that produce new and original ideas [10]. Creative thinking is the beginning of the emergence of creativity, the nature of science and knowledge [11], the main key to the research and innovation process. Creativity is important for formulating new ideas for research and even combining the knowledge that is not interrelated with creative thinking [12, 13].

Many research results imply that schools do not develop students' creative potential [7, 13–16]. Science learning is often not challenging or does not allow students to utilize their creative abilities [17]. The teacher's concern is not teaching creativity to students. It may potentially reduce the academic achievement targets that have been determined. The authoritarian teaching style of the teacher makes students memorize who is reliable but weak in the ability to think about things beyond what they are learning. The ability to think with various answers can stagnate because of habits and fears of being wrong in answering or not daring to differ opinions [18].

Biology as a science subject is oriented towards equipping students with the ability to face life's challenges in the 21st century. Student-centred biology learning, such as investigative laboratory activities, encourages and promotes creative thinking skills. The investigative laboratory integrates research and teaching activities so that students and teachers are learning partners [17], students acquire skills in applying knowledge and finding solutions to problems [19]. Investigative laboratories improve high-level skills, the ability to carry out investigations, foster a sense of responsibility and maturity [20].

We have conducted authentic research project-based laboratory activities to develop creative thinking skills. This laboratory work model is carried out by assuming the form of practicum learning that is investigative with the level of guidance on the priority scale of giving authority to students to be independent, skilled, and responsible. Authentic research project-based laboratory work is conditioned as open inquiry activities. Teachers provide ill-structured problems to stimulate and encourage inquiry and practice growing their creative skills. Students in groups do brainstorming to find ideas for solving problems they face with teacher guidance techniques. Working in groups can increase creativity because sharing different points of view and experiences [21].

We also hypothesize that authentic research project-based laboratory work encourage the development of students' creative thinking skills and scientific work skills. To test this hypothesis, we designed laboratory activities with the following elements: 1) Authentic research project-based laboratory work give students autonomy to make decisions about what and how they conduct their investigations, 2) Authentic research project-based laboratory work allow students to activity with the same interests, and 3) Laboratory activities based on authentic research projects are a way to stimulate students to develop and improve creative thinking skills and scientific work skills.

2 Method

This study involved 67 participants who were divided into two groups of 34 students in the experimental group and 33 students in the control group. The experimental group students carried out la an authentic research project-based laboratory work model, and the control group used a verification laboratory model. Laboratory activities are carried out in groups, consisting of 4–5 people and assigning teachers as facilitators. The authentic research project-based laboratory work model was developed by adapting, modifying, and synthesizing the Project-Based Learning [22] and authentic research [23] models. The control group students did the laboratory work using the laboratory work instructions made and prepared by the teacher. Student worksheet guides are not published.

Data collection and instruments; the data in this study are in the form of quantitative and qualitative data. Quantitative data in the form of pre-test and post-test scores of creative thinking skills. Qualitative data in the form of students' scientific attitude scores and students' self-assessment and peer-assessment scores. To test the hypothesis that laboratory work based on authentic research projects encourages and improves creative thinking skills and scientific work skills, three aspects are assessed, namely: first, students' creative thinking skills before and after the intervention, assessed by giving a creative thinking skill test in the form of essay questions developed. The researcher referred to the TTCT (Torrance, 1974) on the Bacteria material. Second, students' scientific attitudes were assessed using an observation sheet conducted by four trained observers. Third, the students' scientific work ability, which was assessed using self-assessment and peer-assessment techniques, was carried out after the intervention.

Data analysis; to determine whether the value of the variables differed between the experimental and control classes, we used a t-test because both groups had normal distribution and homogeneous variance. Processing was carried out using SPSS version 23 software. The data for increasing creative thinking skills was processed using a normalized gain score [24] and the criteria for interpretation were used from Meltzer [25]. To analyse the results of observation, self-assessment and peer-assessment of focus groups, we used descriptive analysis techniques.

3 Result and Discussion

3.1 Creative Thinking Skill of Students

The results showed that the creative thinking skills were better in the experimental class than the control class. The summary of the results is depicted in Table 1.

Table 1 shows that there is no significant difference between the pre-test scores of students' creative thinking skills in the experimental and control groups. The two models of laboratory activities basically encourage the improvement of students' creative thinking skills. However, the improvement of laboratory work based on authentic research projects is higher than that of verification laboratories. This is evidenced by the results of the t-test (0.05) which shows Sig. (2-tailed) $0.000 > 0.05$ which means that there is a significant difference between the post test scores of creative thinking skills in the experimental class and the control class. This means that laboratory work based on authentic

Table 1. Recapitulation of pre-test, post-test, and N-gain creative thinking skill of students

	Experiment class			Control class			df	p
	N	Mean	Std Dev	N	Mean	Std Dev		
Pre-test	34	21.35	6.060	34	19.50	6.161	66	.216
Post-test	34	60.82	12.970	34	37.94	11.249	66	.000
N-gain	0.50			0.18				

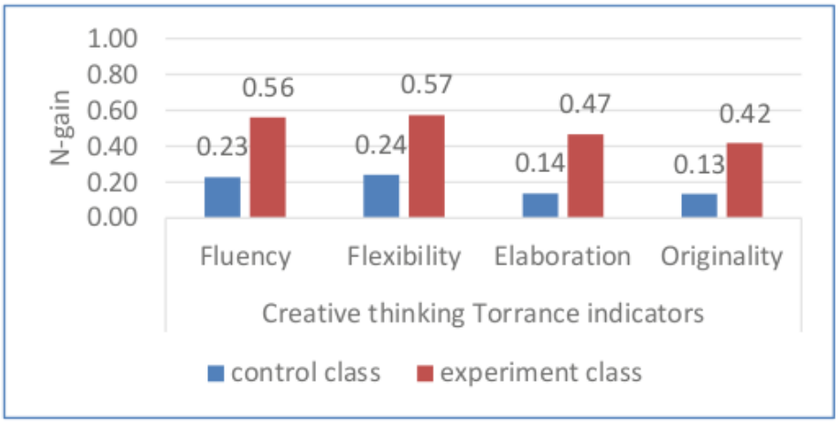

Fig. 1. Improving creative thinking skill of students

research projects is better in building students' creative thinking skills than verification laboratory work.

Furthermore, based on the achievement of the N-gain score for creative thinking skills, it appears that the increase in the experimental class is two times higher (medium category) than the control class (low category). The complete improvement of each indicator of creative thinking skills and N-gain in the experimental class and control class is shown in Fig. 1. The diagram in the image above makes it clear that flexible thinking and fluency experienced the highest increase and original thinking was detected the lowest. This phenomenon applies to both the experimental class and the control class.

The higher achievement of creative thinking skill of students in the experimental class indicated that applying an authentic research project-based laboratory work model had triggered and conditioned students to be curious about something, willing to ask questions and find answers and be able to make reasonable decisions about problems. In many cases, creative thinking can be enhanced by studying knowledge content and participating in scientific investigations [27]. Research as a process of scientific exploration bridges researchers using creative thinking, critical, logical to improve and engage in questions that interest them. Creativity can be fostered and enhanced through the use of tools and strategies [28].

Our research confirms that authentic research project-based laboratory work that has been applied really positions students to do research. Quantitative analysis found a significant increase in creative thinking skills with a change in N-gain in the moderate

category. These results indicate that authentic research project-based laboratory activities encourage creative thinking, foster the freedom to make their own decisions, generate new thoughts and students can plan and conduct research. These results corroborate previous research from [29] that open inquiry learning is the best inquiry model in improving high-level learning outcomes such as making scientific problem definitions, appropriate research design, and ability to conduct research.

The authentic research project-based laboratory work provides freedom of expression, so that students feel free to express their ideas and an atmosphere that is more conducive to conducting laboratory work than verification laboratory work. Providing freedom and flexibility in dealing with situations where students need to apply their knowledge to solve problems is the key to developing scientific creativity [18]. We believe that building creative thinking skills takes a long time and needs to be practiced continuously. Continuous training can stimulate the development of students' creative dispositions and will eventually become a habit. The results that have not been good in research, may be caused because students are not used to thinking and acting differently. There are still many students who feel more comfortable waiting for the teacher's orders than having to find and dig for it themselves. Inharmonious peer relations, problems of courage and openness, limited time, and the difficulties faced by research laboratory work can hinder the development of creative thinking skills, attitudes, and scientific work skills. The development of scientific creativity requires tolerance and a comfortable and democratic environment [30]. Student activities such as brainstorming encourage students to visually analyse various project elements. The interaction between group members strengthens the growth of creativity because each student can encourage each other through sharing ideas and stimulating the growth of other ideas, promoting alternative thinking, connecting unexpected thoughts to each other and generating parallel group thinking [31]. Although the results of our research have not been satisfactory, we recommend that laboratory work based on authentic research projects be introduced in laboratory work, because it is proven to make a significant contribution in stimulating students' creative thinking skills.

3.2 Scientific Attitude During Practicum

Students' scientific attitude is assessed based on formative assessment through observations made by three trained observers and the results are averaged. The average score of students' scientific attitudes on each observation indicator is shown in Fig. 2.

Figure 2 show that there were no low scores for all indicators measured for both class groups. The experimental class students' scientific attitude scores tend to be higher than the control class. The cooperation indicator score shows the highest number compared to the other three indicators; The uniqueness of the students' scientific attitude showed the same pattern in both classes.

Practical activities foster students' scientific attitudes [32]. Laboratory activities build honesty, namely objectivity to observations, build openness to suggestions or input, maintain cooperation and work discipline, and form diligent and conscientious individuals in their work. Aspects of scientific attitude generated in this study indicated by the high scores are shown by students while working on laboratory work. The highest results are shown by cooperation and work discipline indicators, indicating that students

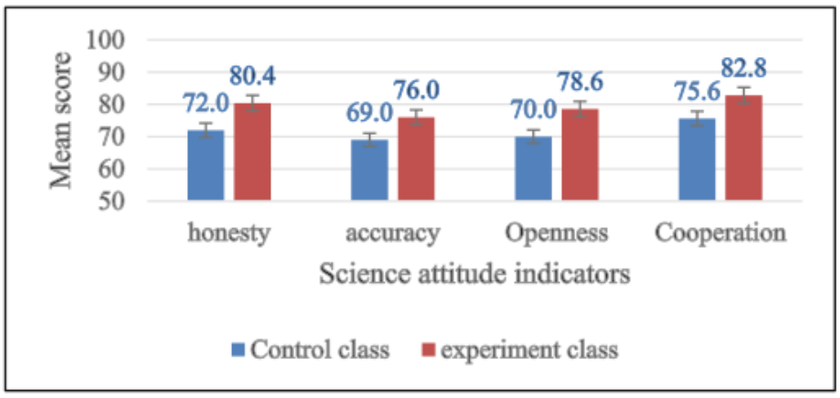

Fig. 2. The average score of achievement of the scientific attitude

show a scientific attitude during laboratory activities as scientists who always require collaboration among group members, involve themselves fully in activities, and try to contribute to the group. These results have also been shown in the research of Tessier & Penniman [33] that the attitude of collaboration, willingness to exchange ideas, and share different perspectives with others can increase creative thinking and the development of students' scientific skills and attitudes. Rodriguez [13] emphasized that in the context of a collaborative attitude, participants build each other's ideas through critical and constructive discussions to reach a common understanding.

3.3 Scientific Work Skill

Assessment of scientific work skills is only presented for the experimental class, considering that the control class only conducts verification experiments. The peer-assessment score is the average score given by peers in the group. The average results of self-assessment and peer-assessment are summarized in Fig. 3.

Students' scientific work skills describe the ability to act as if they were scientists. In this study, the assessment was carried out using self-assessment and peer-assessment techniques which were carried out during the implementation of an authentic research project-based laboratory work. The results showed that the average score of the two assessments did not show much difference. It shows that each individual feels fully involved in every laboratory activity, starting from formulating problems, asking questions, making observations, designing and carrying out investigations, analysing and interpreting data, making conclusions, and communicating the investigation results. Students' scientific work skills can be seen based on students' solutions to science problems, and the traits that define scientific skills are manifested in students' high scores [18]. Students involved in the scientific inquiry will have increased confidence and confidence as science students [34].

Student scores as the desired learning outcomes, can be achieved well on all indicators that are promoted. These results corroborate the findings of previous studies that independent inquiry such as investigative laboratory work not only stimulates student interest, but also provides in-depth knowledge [20, 35], improves scientific attitudes and scientific work skills and can be an effective strategy for teaching science compared to

Fig. 3. The mean score of scientific workability

laboratories conventional [15, 35, 37]. Students are satisfied with their project laboratory work, they acquire the skills needed to face the challenges of their future profession. The knowledge and skills he has acquired are of course maintained and developed continuously. The previous finding was that free inquiry promotes the development of transversal skills, the ability to take responsibility for autonomy, develop self-reflection skills, work cooperatively and increase knowledge retention for the long term [29].

Tutors play an important role in laboratory work based on authentic research projects and ideally should have experience as facilitators and guides of the research process. As a facilitator, the tutor must direct students by creating a learning environment that is conducive, safe, gives freedom, is flexible to situations, is open to new ideas [38]. Therefore, the teacher as a facilitator must be able to guide the course of the laboratory work process and provide comprehensive knowledge at the end of the activity. Teachers must be willing to change their role as knowledge providers into teachers who facilitate and guide students to acquire knowledge with more persistent efforts. The most important thing that teachers need to pay attention to is that giving assignments that are too easy or too difficult will reduce students' creativity. Many students will experience decreased concentration and decreased student involvement in learning. Students tend to give positive responses to learning if their motivation is good and shows negative emotions because of anxiety and stress due to the learning load that is too high. Emotions often depend on a balance between challenge and student competence; good balance enriches the learning process [39].

4 Conclusion

Authentic research project-based laboratory work is effective for improving creative thinking skills, instilling scientific attitudes and growing students' scientific work abilities. The creative thinking skills of students who do laboratory work based on authentic research projects increase two times higher than students who use the verification laboratory work model. The implementation of this model also results in a change in scientific attitude that is better (higher) than the use of the verification laboratory work model. The

results of the self-assessment and peer-assessment assessment of scientific works skills, which are only focused on laboratory work classes based on authentic research projects, show results in the good category and both scores are balanced between self-assessment and peer-assessment assessments, indicating the seriousness of students in answering the questionnaire according to his personality and peer objectives. Thus, authentic research project-based laboratory work potential and can be recommended to be applied by teachers in learning laboratory work to encourage the development of creative thinking skills (scientific creativity) and teach students scientific attitudes and skills.

References

1. Bosch, G., Caswadevall, A.: Graduate biomedical science education needs a new philosophy. MBio 8 pp. 25–29 (2017).
2. Greenstein, L.: Assessing 21st Century Skills. California: Corwin a Sage Company. (2012).
3. Zubaidah, S.: Keterampilan Abad Ke-21: Keterampilan Yang Diajarkan Melalui Pembelajaran. Semin. Nas. Pendidik. dengan tema Isu-isu Strateg. Pembelajaran MIPA Abad 21 Desember pp. 1–17 (2016).
4. Corebima, A. D.: Pembelajaran Biologi di Indonesia Bukan untuk Hidup. Proceeding Biology Education Conference pp. 8–22 (2016).
5. Waldrop, M.: The science of teaching science, Nature 523 pp. 272–4 (2015).
6. Criswell, B.: Framing inquiry in high school chemistry: Helping students see the bigger picture. J. Chem. Educ., 89(2) pp. 199–205 (2012).
7. Sukarso, A., Widodo, A., Rochintaniawati, D., Purwianingsih, W.: The potential of students' creative disposition as a perspective to develop creative teaching and learning for senior high school biological science. J. Phys. Conf. Ser.1157 022092 (2019).
8. Widodo. A., Maria, R. A., Fitriani, A.: Peranan praktikum riil dan praktikum virtual dalam membangun kreativitas siswa. J. Pengajaran MIPA 21(1) pp. 92–102 (2012).
9. Plucker, J. A., Beghetto, R.A., Dow, G. T.: Why isn't creativity more important to educational psychologists? Potentials, pitfalls, and future directions in creativity research. Educ. Psychol., 39(2) pp. 83–96 (2004).
10. Amabile, T. M.: Creativity in context. London: Routledge (1996).
11. Beghetto, R., Kaufman, J.: Fundamentals of creativity. Educ Leadersh 70(5) pp. 10–15 (2013).
12. Barrow, L.: Encouraging creativity with scientific inquiry. Creat Educ.1 pp. 1–6, (2010).
13. Rodríguez, G., Zhou, C., Carrio, M.: Creativity in biomedical education: senior teaching and research staff's conceptualization and implications for pedagogy development. Int J Eng Educ 33(1) pp. 30–43 (2017).
14. Runco, M. A.: Comments on where the creativity research has been and where is it going. J. Creat. Behav. 51(4) pp. 308–313 (2017).
15. Sari, D. K., Permanasari, A., Supriyanti, F. M.T.: Profile of students' creative thinking skills on quantitative project-based protein testing using local materials. J. Pendidik. IPA Indones. 6(1) pp. 71–75 (2017).
16. Ahmadi, N., Besançon, M.: Creativity as a stepping stone towards developing other competencies in classrooms. Educ. Res. Int. pp. 1–9 (2017).
17. Trnova, E.: Hands-on experiments and creativity. Proc. 12th Int. Conf. Hands-on Sci. August, pp. 103–109 (2015).
18. Hu, W., Wu, B., Ja, X., Yi, X., Duan, C., Meyer, W., Kaufman, J. C.: Increasing students scientific creativity: The 'learn to think' intervenstion program, J. Creat. Behav. 47(1) pp. 3–21 (2013).

19. Hofstein, A., Lunetta, V.N.: The laboratory in science education: Foundations for the twenty-first century, Sci. Educ. 88(1) pp. 28–54 (2004).
20. Chelang, C.: Effects of practical investigation on scientific creativity amongst secondary schools biology students in Kericho district, Kenya. J. Educ. Pract. 5(8) pp. 43–51 (2014).
21. Gupta, S.: Development of creativity: Interplay of biological, psychological and social factors. International J. Res. Educ. Sci. 3(12) pp. 195–202 (2015).
22. Doppelt, Y.: Assessment of project-based learning in a Mechatronics context J. Technol. Educ. 16(2) pp. 7–24 (2005).
23. Domin, D.S.: A review of laboratory instruction styles. J. Chem. Educ. 76(4) p. 543, (1999).
24. Torrance, E.P.: Torrance tests of creative thinking. Lexington, MA: Personnel Press (1974).
25. Hake, R. R.: Interactive-engagement versus traditional methods: A six-thousand-student survey of mechanics test data for introductory physics courses. Am. J. Physic 66(1) pp. 64–74 (1989).
26. Meltzer, D.E.: The relationship between mathematics preparation and conceptual learning gains in physics: A possible 'hidden variable' in diagnostic pretest scores. Am. J. Phys. 70(12) pp. 1259–1268 (2002).
27. Ersoy, E., Başer, N.: The effects of problem-based learning method in higher education on creative thinking Procedia - Soc. Behav. Sci. 116 pp. 3494–3498, 2014.
28. Park, S. Seung, E.: Creativity in the science classroom: Four strategies to help students think outside the box. Sci. Teach. 75 p. 45 (2008).
29. Spronken-Smith, R., Walker, R.: Can inquiry-based learning strengthen the links between teaching and disciplinary research? Stud High Educ. 35(6) pp. 723–40 (2010).
30. Kay, S.B., Montgomery, D., Baloche, L.: Teaching creativity at the college level: A synthesis of curricular components perceived as important by instructors. Creat. Res. J. 8(1) pp. 83–89 (1995).
31. Roessingh, H., Chambers, W.: Project-based learning and pedagogy in teacher preparation: Staking out the theoretical mid-ground. Int. J. Teach. Learn. High. Educ. 23(1) pp. 60–71 (2011).
32. Millar, R.: The Role of Practical Work in the Teaching and Learning of Science. Paper prepared for the Committee: High School Science Laboratories: Role and Vision (2004).
33. Tessier, J.T., Penniman, C.A.: An inquiry-based laboratory design for microbial ecology. Bioscene 32(4) pp. 6–11 (2006).
34. National Research Council: National Science Education Standards. Washington: National Academy Press (1996).
35. Puttick, G., Drayton, B., Cohen, E., Cohen, E.: A study of the literature on Lab-based instruction in biology. Am. Biol. Teach. 77 pp. 12–18 (2015).
36. Ural, E.: The effect of guided-inquiry laboratory experiments on science education students' chemistry laboratory attitudes, anxiety and achievement, J. Educ. Train. Stud. 4 pp. 217–227 (2016).
37. Ngui, G. K., Lay, Y.F.: Investigating the effect of stress-coping abilities on stress in practicum training. Asia-Pacific Educ. Res. 27 pp. 335–343 (2018).
38. Daud, A. D., Omar, J., Turiman, P., Osman, K.: Creativity in science education. Procedia Soc Behav Sci. 59 pp. 467–74 (2012).
39. Litmanen, T., Lonka, K., Inkinen, M., Lipponen, L., Hakkarainen, K.: Capturing teacher students' emotional experiences in context: does inquiry-based learning make a difference? Instr Sci. 40 pp. 1083–101 (2012).

Investigating the Effect of Authentic Research Project-Based Laboratory Work on Creative Thinking, Attitudes and Scientific Work Skills of High School Students

ORIGINALITY REPORT

14%	10%	10%	4%
SIMILARITY INDEX	INTERNET SOURCES	PUBLICATIONS	STUDENT PAPERS

PRIMARY SOURCES

1	bmcmededuc.biomedcentral.com Internet Source	3%
2	A Setiawan, A Malik, A Suhandi, A Permanasari. "Effect of Higher Order Thinking Laboratory on the Improvement of Critical and Creative Thinking Skills", IOP Conference Series: Materials Science and Engineering, 2018 Publication	1%
3	www.researchgate.net Internet Source	1%
4	D. K. Sari, K. A. Wancik, J. M. Sufiana, M. E. Haryani. "Analysis of increasing creative thinking skills in the use of local materials in project qualitative biochemical analysis practicum", Journal of Physics: Conference Series, 2021 Publication	1%
5	Bettina Wagner, Clemens Koob. "The relationship between leader-member exchange and work engagement in social work: a mediation analysis of job resources", Heliyon, 2022 Publication	1%
6	download.atlantis-press.com Internet Source	1%

www.ejosdr.com

7	Internet Source	1 %
8	garuda.kemdikbud.go.id Internet Source	1 %
9	worldwidescience.org Internet Source	<1 %
10	E V Aulia, S Poedjiastoeti, R Agustini. "The Effectiveness of Guided Inquiry-based Learning Material on Students' Science Literacy Skills", Journal of Physics: Conference Series, 2018 Publication	<1 %
11	ijhss.net Internet Source	<1 %
12	Submitted to Sekolah Bogor Raya Student Paper	<1 %
13	Iis Tarsiyah, Abdul Hakim, Laili Komariyah. "The effect of guided inquiry learning model oriented multi-representation on multi-representation ability of senior high students in temperature and heat chapter", AIP Publishing, 2022 Publication	<1 %
14	journals.sagepub.com Internet Source	<1 %
15	baixardoc.com Internet Source	<1 %
16	journaljesbs.com Internet Source	<1 %
17	doczz.net Internet Source	<1 %
18	etheses.uin-malang.ac.id Internet Source	<1 %

19	journal.unnes.ac.id Internet Source	<1 %
20	un-pub.eu Internet Source	<1 %
21	Chandra Kirana, Ety Tejo Dwi Cahyowati. "An implementation of open-ended approach with TPS (Think Pair Share) to improve creative thinking skills for student of class VII-B of SMP Negeri 9 Malang", AIP Publishing, 2020 Publication	<1 %
22	M. A. Tiadarma, Sahyar, W. Bunawan. "Development of creative thinking skills test instruments on kinematics materials for SMA/MA students in Medan", AIP Publishing, 2022 Publication	<1 %
23	people.utm.my Internet Source	<1 %
24	"Active Learning in College Science", Springer Science and Business Media LLC, 2020 Publication	<1 %
25	Sutarto, Nuriman, A S Budiarso, N Hasanah. "Application of STMCpE-Based chemistry books with chemo-entrepreneurship orientation in the learning of acid-base solutions to improve students' creative thinking skills", Journal of Physics: Conference Series, 2021 Publication	<1 %

Exclude quotes	On	Exclude matches	< 5 words
Exclude bibliography	On		

Investigating the Effect of Authentic Research Project-Based Laboratory Work on Creative Thinking, Attitudes and Scientific Work Skills of High School Students

GRADEMARK REPORT

FINAL GRADE

/0

GENERAL COMMENTS

Instructor

PAGE 1

PAGE 2

PAGE 3

PAGE 4

PAGE 5

PAGE 6

PAGE 7

PAGE 8

PAGE 9

PAGE 10