JPPIPA 9(10) (2023)

Jurnal Penelitian Pendidikan IPA

Journal of Research in Science Education

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

Student Identity and Guided Inquiry Learning in Junior High School Students: A Correlation Analysis

Kiki Septaria[1*], Khoirotun Nissak[1], Siska Ayu Wulandari[1]

[1] Department of Science Education, Faculty of Teacher Training and Education, Lamongan Islamic University, Lamongan, Indonesia.

Received: July 7, 2023
Revised: September 25, 2023
Accepted: October 25, 2023
Published: October 31, 2023

Corresponding Author:
Kiki Septaria
kikiseptaria@unisla.ac.id

DOI: 10.29303/jppipa.v9i10.4584

Abstract: This study depends on why it's important for an examination of students' scientific identities to demonstrate that a student is scientifically capable of identifying and resolving issues in the form of natural occurrences. The purpose of this research is to determine the rise in scientific identity utilizing the guided inquiry learning model, as well as the closeness of the variable link between scientific identity and the guided inquiry learning model. This study employed a one-group pre-test and post-test design with a quantitative approach and a population or sample through purposive sampling with a sample size of 60 students. This study was conducted Turi Lamongan State Junior High School. A scientific identity questionnaire exam and a cognitive ability test were used to collect data for this investigation. In this study, N-gain was used to see a rise in the science identity questionnaire and cognitive ability tests, followed by a correlation test to establish the degree of closeness between science identity and the guided inquiry learning model. This study's findings are as follows: 1) improving scientific identity through guided inquiry learning 2) Scientific identity and the guided inquiry learning methodology are linked.

Keywords: Cognitive guided inquiry; Science identity, Science learning

Introduction

Education is a process that is carried out consciously and planned in order to create an active learning environment in order to develop the potential that exists in him to ensure that he possesses spiritual strength, religion, discipline, cognitive ability, noble character, skills needed by his community, nation, and state (Chen & Wei, 2020; Hasbullah, 2015). Natural-science (IPA) quality of teaching in schools is inadequate. Problems that frequently arise include a shortage of learning materials connected to the implementation of the 2013 Curriculum. Data from the Research and Development Agency of the Ministry of Education and Culture of the Republic of Indonesia show that only 8 junior high schools (SMP) in Indonesia have earned international recognition in the Middle Years Program (MYP) category, out of a total of 20,918 junior high schools (SMP) (Jundu et al., 2020; Nurwahidah, 2020). According to data from international institutions such as The Third International Mathematics and Science Study (TIMSS) in 2007, Indonesian junior high school students performed 35th out of 48 countries polled in the field of Natural Science. In 2015, identical research ranked Indonesian students' science achievement 40th out of 48 countries (Jufrida et al., 2020; Septaria et al., 2022).

Scientific learning is connected to how learners methodically acquire information about nature, therefore scientific learning demands students to grasp knowledge in the form of facts, concepts, or principles, as well as a process of discovery that allows students to think critically (Achyanadia, 2016; Burke & Navas Iannini, 2021). Learning is supposed to be available to expand knowing so that students may use it to solve difficulties in their daily lives (Yudhistira et al., 2020). Science education is an integrating investigation with understanding processes, and the growth of science ideas must be connected to the development of skills and attitudes. Science learning is offered through stressing student participation in an active learning process and teaching students to think critically and objectively (Subarkah, 2018). Teachers must use specific learning techniques or models to help students develop critical

How to Cite:
Septaria, K., Nissak, K., & Wulandari, S. A. (2023). Student Identity and Guided Inquiry Learning in Junior High School Students: A Correlation Analysis. *Jurnal Penelitian Pendidikan IPA*, *9*(10), 8351–8358. https://doi.org/10.29303/jppipa.v9i10.4584

and objective thinking abilities. A guided inquiry-based learning model is one learning paradigm that may be used to strengthen students' skills (Henry et al., 2021; Indrianto & Nurul Fatmawati, 2020). Learning about science is utilized through constructed reality instruction to build students' abilities in scientifically examining and comprehending their environment. The model for guided inquiry learning is one student-centered learning strategy that emphasizes constructivism learning while improving creative thinking abilities (Agustina et al., 2020).

According to the findings of the interviews performed at SMPN 1 Turi Lamongan on November 10, 2021, by the scientific subject tutor, students' enthusiasm in the science learning process was relatively poor. This is due to the fact that scientific learning is dull, inert, and lacks creativity, as well as a lack of varied/innovative learning methodologies. Teachers are increasingly employing the Discovery Learning paradigm. The discovery learning paradigm utilized by the teacher in class demonstrates that the learning syntax given has not been applied in its entirety. This is supported by the findings of researcher observations taken while the instructor lectured in class for three meetings. Observations on learning materials revealed disparities between the instructor's lesson plans and execution while learning in class, as well as interviews with 20% of the students in one class about how the teacher taught in class. Three classes (VIII C, VIII D, and VIII G) were chosen to be interviewed on how the instructor taught in class, with the average student responding that scientific learning was uninteresting, pupils seldom asking and answering questions, and a lack of learning models. Learning results are reported to be insufficient, and science identity is poor. This is shown by an abundance of student learning abilities, such as asking and answering instructor questions, seldom completing assignments, a passive learning environment, and low-test results. The average student score demonstrates this. The demanding one is 60% in the even semester with a KKM of 75 in science topics and a one-semester evaluation recap.

Problems with learning interest are common since the learning process is still concentrated on the instructor, which contributes to low student learning results. All of these factors have an influence on pupils, as seen by insufficient of interest in receiving instruction, particularly in science courses, and low test results (Suarbawa, 2019). The same issue was discovered in an investigation carried out by Jufrida et al. (2020), who explained that the subjects at school that were not in demand at the top were mathematics, science, and English, as evidenced by the attitude of students when learning was not enthusiastic in following these three subjects because the teacher is too serious in teaching with boring teaching methods, the lessons are quite difficult, and students are bored. The main variables that motivate students to participate in learning include the teacher's teaching style, the models and techniques utilized, the teacher's personality, the learning facilities used, and the classroom climate. The capacity of learners to acquire knowledge following an action or interaction of learning activities that may be examined using the cognitive, emotional, and psychomotor domains. The accomplishment of student learning outcomes can be influenced by guided inquiry learning and student learning motivation (Komariyah, 2022; Woods & Hsu, 2020).

Effective educational instruction is the strategy used by teachers to establish conditions for teaching and learning activities that are enjoyable and involve students directly, so that students not only obtain information but also enhance their emotional and mental motor skills (Roth et al., 2021; Septaria et al., 2019). Teachers' learning models are intended to be more successful in reaching learning objectives; nevertheless, learning science is extremely difficult to use the lecture method since it is connected to thinking abilities, work, scientific attitudes, and communication (Jundu et al., 2020). The guided inquiry learning paradigm is highly significant to employ in learning since it allows students to be more adept and skilled in presentations, answering questions, and actively asking questions. Sulisworo et al. (2021) shared the same viewpoint, stating that the inquiry learning paradigm included asking questions, gathering information, and performing investigations. The inquiry learning paradigm can help students become more confident, competent, autonomous, and capable of working with others. Guided inquiry may be used to teach students about fundamental ideas and principles in particular domains of science, allowing them to study physics by direct observation of physical occurrences and processes (Agustina et al., 2020; Biggers, 2018).

In addition to observation, researchers conducted questions and answers related to performance, competence, recognition, and interest after studying science with class VIII students of the same class who were used as informants for previous interviews regarding teachers teaching in class, and if presented on a scale of 10% -100% in answering questions related to the four indicators, the average student answer is still below the 50% scale, indicating that the average student answer is still below the 50% scale, indicating that the average student answer is still below the 50% scale, indicating that One of the most essential themes in science education is scientific identity. Science identity is effective for directly increasing interest, understanding,

and involvement in science. Students' scientific identities may be employed as problem solvers in inquiry-based learning, therefore instructors must position students and themselves as scientists (Esparza et al., 2020; Ross et al., 2014; Vincent-Ruz & Schunn, 2018). A rise in scientific identity may be measured by numerous aspects, including performance, competence, recognition, and curiosity (Chen & Wei, 2020).

The previous research conducted by Chen et al. (2020) with novelty is based on an analysis of scientific identity that is linked to an inquiry learning model that has not yet been developed. Other studies have looked into it. This research is critical in order to give a foundation for analyzing students' science identities and determining whether or not they may be impacted by the classroom environment during learning created by the instructor in the form of a specific learning model.

Method

The technique employed in this study is a quantitative approach with pre-experimental research. Researchers utilize a quantitative technique in this study because it uses populations and samples by collecting data using specified instruments and evaluating data with the goal of testing a theory, demonstrating a certain variable, and developing a hypothesis.

The One Group pretest posttest research design was employed in this study, as shown in table 1.

Table 1. Research design

Group	Pretest	Treatment	Posttest
Class A	O_{A1}	X_1	O_{A2}
Class B	O_{B1}	X_1	O_{B2}

Information:

O_{A1} : Pre-test in class A

O_{B2} : Pre-test in class B

X_1 : Learning treatment using the Guided Inquiry model

O_{A2} : Post-test in class A

O_{A2} : Post-test in class B

Population and Sample

The population in this study were 9 class VIII students of SMPN 1 Turi, a total of 270 students enrolled in the odd semester of the 2022/2023 academic year. Sampling in this study using purposive sampling by taking into account certain considerations. The number of samples used by researchers can be seen in table 2.

Explaining research chronological, including research method, research design, research procedure (in the form of algorithms, flow chart, storyboard or other), how to test and data acquisition, time and place of the research (if the article based on the field research), mention the hypothesis if your article has it (optional). The description of the course of research should be supported by **references**, so the explanation can be accepted scientifically.

Table 2. Student Sample

Class	Number of Students	Age Range (Year)	Gender	
			Male	Female
A	30	13-14	16	14
B	30	13-14	18	12
Total	60	-	34	26

Instruments for Research

A scientific identity questionnaire (Pre-Test & Post Test) and cognitive tests (Pre-Test & Post Test) were employed as tools. The student science identity questionnaire is an adaption of a prior researcher's questionnaire used to determine science identification before and after a pre-test and post-test. Cognitive skills exams are learning indicators that use instruments devised by the researchers.

Data Collecting Method

Techniques for data collecting are a highly crucial step in a study that is also beneficial for creating data that fits the necessary requirements (Sugiyono, 2015). This study employed cognitive tests to assess student learning results and questionnaires to assess students' scientific identities. The tests are offered in the form of a pre-test and a post-test. According to Sezer and Yilmaz (2019), a test may be deemed to be excellent as a measuring tool if it fits the requirements, namely the validity test, and the test tool can be valid if the test employed can measure something to be measured.

Data Analysis Method

The outcomes of this study's data were examined utilizing the N-Gain and Correlation test analytical methodologies. The N Gain test was used to identify the category of increasing scientific identification before and after using the Guided Inquiry learning paradigm in science learning. Following the collection of study data, the researcher recapitulated and evaluated it using a correlation test to establish the degree of closeness of the link between the evaluation of the inquiry learning model and the identification of science. Prior to the correlation test, a preparatory test using the Homogeneity and Normality tests was performed. SPSS Software was used to perform the correlation test.

Result and Discussion

Instrument Feasibility Analysis

When the test or the test items can measure what is to be tested, the data is considered to be legitimate. Valid or valid instruments are suitable for use as data

collectors. This validation test was conducted by scientific education lecturers, Mr. AS as validator 1 and Mr. MH as material expert validator. Table 3 shows the calculated outcome of the instrument validation findings from the two validators.

Table 3. Validation Results

Instrument	V_1	V_2	Average	Category
LKPD	95	76.1	85.5	VV
RPP	95	88.4	91.7	VV
Test Cognitive	92	92.0	92.0	VV
Questionnaire	95	90.0	92.5	VV

Information:
V_1 : Validator 1 VV : Very Valid
V_2 : Validator 2 RPP : Lesson plan
LKDP : Student worksheets

The instrument used in providing learning implementation. in class is said to be valid if it has previously passed the validation test to the material expert validator, as the researcher has done with the average value of the two validators Student worksheets (85.5), Lesson plan (91.7), Test Cognitive (92) and questionnaire (92.5). Implementation of a good learning model or achievement in accordance with the syntax of the learning model employed might boost student passion for learning and capacity to think critically (Henry et al., 2021; Ragab et al., 2018; Safirah et al., 2022). This is consistent with the findings of a study performed by Pisl et al. (2021), which found that implementing the guided inquiry learning methodology had a favourable influence on students' Metacognitive Skills on the Concept of the Digestive System. According to the findings of the researchers' observations about the implementation of the guided inquiry learning model, virtually all of the syntax in the lesson plans were carried out with an overall average result of 87.71, which was classified as very excellent.

Implementation of the Guided Inquiry Learning Model

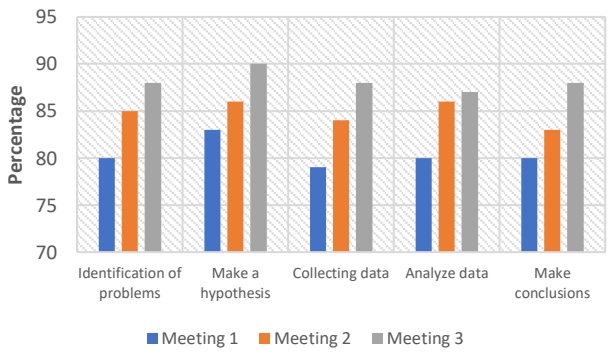

Figure 1. The percentage of guided inquiry model syntax implementation

The guided inquiry technique was used in both classrooms for three meetings and three observers, with five syntaxes carried out in each meeting. According to Figure 1, each syntactic performed during the learning process has risen, with each meeting having implementation criteria in the high category (an average percentage of 84). Syntax for recognizing issues has an average of 84, hypotheses have an average of 86, data collection has an average of 84, data analysis has an average of 84, and conclusions have an average of 84.

N-gain Score Improvement

The table below shows the results of calculating the average pretest and posttest scores of class A and B students.

Table 4. Shows the N-gain Values for Class A before and After the Pretest and Posttest

	Science identity			
	Pre	Post	N-Gain Score	Criteria
Mean	48.5	82.8	0.678	Medium
	Cognitive			
	Pre	Post	N-Gain Score	Criteria
	49.6	78.6	0.605	Medium

According to table 4, the pre-test and post-test scores for class A from the scientific identity questionnaire for students before treatment were 48.5, and after treatment, the post-test score was 82.8 with an N-gain score of 0.678, indicating an increase in the moderate category. The results of the cognitive test pre-test before treatment were 49.6, and after treatment, the post-test value was 78.6 with an N-gain score of 0.605, indicating a rise in the moderate range. Based on a more extensive study of the science identification indicators examined, it was discovered that class A students had an average rise in the science recognition indicator score that was greater than the other indicator scores, namely 0.73. Meanwhile, additional indices of scientific identity include curiosity, competence, and performance in science, which are 0.67, 0.66, and 0.65, respectively. The results of the n-gain measurement in class B are shown in table 5.

According to table 5, the pre-test and post-test scores for class B, the results of the student science identity questionnaire before treatment were 47.6 and 82.8 after treatment, with an N-gain score of 0.678, indicating an increase in the moderate category. The pre-test results of cognitive tests before treatment were 50, and after treatment, the post-test value was 79.1 with an N-gain score of 0.617, indicating a rise in the moderate range. The findings of the cognitive test pre-test before treatment were 49.6 and after treatment, 78.6 with an N-gain score of 0.605, indicating a rise in the moderate

range. According to table 4.8, the pre-test and post-test scores for class B were 47.6 and 82.8, respectively, with an N-gain score of 0.678, indicating an increase in the moderate category. Then, before treatment, the pre-test results of cognitive tests were 50, and after treatment, the post-test value was 79.1 with an N-gain score of 0.617, indicating a rise in the moderate range. Based on a more extensive study of the science identity indicators assessed in class B, it was discovered that class B students had a greater average score rise in science performance indicators, namely 0.71. Other indications of scientific identity include curiosity, competence, and recognition in the field of science, which are 0.67, 0.65, and 0.65, respectively. This illustrates that the indicators that have the biggest growth between classes A and B have distinct findings, yet these two classes have a scientific identity that increases in the moderate category.

Table 5. Class B Pre-test and Post-test N-gain Values

	Science identity			
	Pre	Post	N-Gain Score	Criteria
Mean	47.6	83	0.671	Medium
	Cognitive			
	Pre	Post	N-Gain Score	Criteria
	50	79.16	0.617	Medium

It can be said that guided inquiry learning models can support student learning enthusiasm by thinking critically and actively in asking questions and conducting experiments with teacher guidance so that learning achievements can be carried out well. Another study found that the guided inquiry learning model can improve students' cognitive skills in the area of substance stress (Pisl et al., 2021; Septaria & Dewanti, 2021; Thuneberg et al., 2018). This improvement in scientific identity is the outcome of employing the guided inquiry approach, which makes it easier to use the grammar (Woods & Hsu, 2020). Scientific identity markers relating to scientific performance can be supported in each course through experimental activities and data collecting (Chen & Wei, 2020; Frederick et al., 2021). Students' experimental activities were directly able to increase students' psychomotor skills and create knowledge independently for students through peer activities (Jundu et al., 2020; Ozkan & Umdu Topsakal, 2021).

It is aided throughout the process of recognizing issues, formulating hypotheses, and drawing conclusions on the guided inquiry syntax in the science identity indication associated to science competency acquired by pupils (Agustina et al., 2020; Huvard et al., 2020). Students are taught to use all of the information they have, including all five senses, to solve issues and provide suggestions for solutions (Suarbawa, 2019). Collecting information for students may be done in a variety of ways to improve student literacy and adaption to varied situations (Achyanadia, 2016). Exercises that require students to collect information quickly and precisely can help them develop their abilities, particularly those linked to the science topic being studied (Yudhistira et al., 2020).

Based on the influence of learning gained by students, the indicator of interest in science on students' scientific identity has increased significantly. Students will be interested in a topic if learning is enjoyable (Burke & Navas Iannini, 2021; Huvard et al., 2020). Students' enjoyment can stem from a variety of causes, including compatibility of learning styles, differences in learning techniques, and direct student engagement during learning (Jufrida et al., 2020). Even if a teacher frequently uses learning that engages students as learning subjects in lesson plans, there may be disparities in treatment in practice (Biggers, 2018; Hasbullah, 2015).

The science recognition indicator is obtained after implementing the guided inquiry learning model, which shows a significant increase. This is because students find it easy to understand any knowledge related to science concepts and easily carry out each stage of experimental activities or simple experiments while learning science (Chankseliani et al., 2021; Jufrida et al., 2020). Pupils' recognition is intended to transform the perception of science topics, which have a reputation for being demanding, challenging, and unpleasant for pupils (Edi Supartawan et al., 2021). The use of guided inquiry learning models can boost students' interest in learning using syntax that promotes students' scientific identity, which helps to increase students' scientific identity. This is consistent with the findings of a study titled "Science in the Learning Gardens (SciLG): a study of students' motivation, achievement, and science identity in low-income middle schools" done by (Deemer et al., 2022; Esparza et al., 2020). Because outdoor learning may improve student performance abilities, studying in school gardens has the ability to boost kids' scientific identities (Huvard et al., 2020).

Variable Relations Correlation Test

The correlation test is used to measure the degree of similarity between two variables, specifically independent and dependent variables with a normal data distribution. Table 11 shows the results of the correlation test from the identity of science and the inquiry learning model, which was aided by the SPSS software type 2.6.

Table 6. Correlation Test Results

		Post test	Post test
Post test	Pearson Correlation	1	.422**
	Sig. (2-tailed)		.001
	N	60	60
Post test	Pearson Correlation	.422**	1
	Sig. (2-tailed)	.001	
	N	60	60

**Correlation is significant at the 0.01 level (2-tailed).

If the sig (2-tailed) value is less than 0.05, there is a correlation; if the sig (2-tailed) value is more than 0.05, there is no association. The significance value for sig (2-tailed) is 0.001 less than 0.05, indicating that there is a link. The correlation test is a form of parametric statistics that may be used in conjunction with precondition tests of homogeneity and normality in the normal distribution. According to the normality test findings of the pretest and posttest of the questionnaire, the normality test results of the pretest questionnaire data had the probabilities of class A and class B of 0.172 and 0.064, respectively. The post-test questionnaire results with class A and B sig probabilities were 0.123 and 0.077, respectively. As a result of the normal distribution of the pre-test and post-test questionnaires, the data analysis employed parametric statistical analysis. The normality test findings of the cognitive pre-test and post-test data show that the normality test results for the cognitive pre-test data had sig probabilities of class A and class B of 0.129 and 0.183, respectively. Cognitive post-test results with class A and B sig probability of 0.126 and 0.165, respectively. As a result of the cognitive pre-test and post-test being normally distributed, data analysis employs parametric statistical analysis. The pre-test and post-test questionnaire homogeneity tests show that with sig values of 1.000 and 0.776, respectively, the pre-test and post-test data exhibit homogeneity variances. Having sig coefficients of 0.925 and 0.818. As a result, the variances in the pre-test and post-test data are homogeneous.

Based on the table of correlation test results from the post-test of the scientific identity questionnaire and post-test of the cognitive test, which aims to determine the degree of closeness of the relationship between two variables, namely scientific identity and the guided inquiry learning model, there is a relationship between scientific identity and the guided inquiry model with a sig (2-tailed) significance value of $0.001<0.05$. The Pearson correlation has a value of 0.422, indicating that the association is modest. The guided inquiry learning model is linked to science identity since both can mutually improve cognitive skills and scientific identity because the guided inquiry learning syntax includes markers of science identity. This is consistent with previous research by Chen et al. (2020), who explained that the identity enhancement factor includes indicators (Performance, Interest, and Competence) in their paper "Development and Validation of an Instrument to Measure High School Students' Science Identity in Science Learning." Because the guided inquiry learning model teaches students to think critically, this research has a positive impact on the world of education by increasing student interest in learning, being more active in learning, and enthusiastic about not being lazy to ask questions and answers when learning occurs.

Conclusion

It is argued that it represents a rise in the moderate category based on the findings of the N-gain test from developing scientific identity and directed inquiry. Correlation test results from the value of the scientific identity questionnaire post-test and the cognitive test post-test, which aims to determine the degree of closeness of the relationship between two variables, namely scientific identity and the guided inquiry learning model, with a sig (2-tailed) significance value of $0.001<0.05$, indicating that there is a relationship between scientific identity and the guided inquiry model.

Acknowledgments

Our want to express our gratitude to the teachers, administrators, and students of State 1 Turi Junior High School for their contributions to the purposes of this investigation, from data collection to completion.

Author Contributions

Kiki Septaria is a researcher who generates research ideas, analyzes data, analyzes discussions, and refines research. Khoirotun Nissak collected data and summarized study findings. Agus Santoso will help with analyzing and conducting studies reporting.

Funding

This study was entirely supported by the authoring team members, with no contributions from other people or organizations.

Conflict of Interest

The researchers reveal that there are no conflicts of interest in the publishing of this research.

References

Achyanadia, S. (2016). Peran Teknologi Pendidikan Dalam Meningkatkan Kualitas Sdm. *Jurnal Teknologi Pendidikan*, *5*(1), 104–112. https://doi.org/10.32832/tek.pend.v5i1.486

Agustina, K., Sahidu, H., & Gunada, I. W. (2020). Pengaruh Model Pembelajaran Inkuiri Terbimbing

Berbantuan Media PheT Terhadap Kemampuan Pemecahan Masalah dan Berpikir Kritis Fisika Peserta Didik SMA. *Jurnal Pendidikan Fisika Dan Teknologi*, *6*(1), 17. https://doi.org/10.29303/jpft.v6i1.1514

Biggers, M. (2018). Questioning Questions: Elementary Teachers' Adaptations of Investigation Questions Across the Inquiry Continuum. *Research in Science Education*, *48*(1), 1–28. https://doi.org/10.1007/s11165-016-9556-4

Burke, L. E. C. A., & Navas Iannini, A. M. (2021). Science engagement as insight into the science identity work nurtured in community-based science clubs. *Journal of Research in Science Teaching*, *58*(9), 1425–1454. https://doi.org/10.1002/tea.21714

Chankseliani, M., Qoraboyev, I., & Gimranova, D. (2021). Higher education contributing to local, national, and global development: new empirical and conceptual insights. *Higher Education*, *81*(1), 109–127. https://doi.org/10.1007/s10734-020-00565-8

Chen, S., & Wei, B. (2020). Development and validation of an instrument to measure high school students' science identity in science learning. *Research in Science Education*, 1-16. https://doi.org/10.1007/s11165-020-09932-y

Deemer, E. D., Ogas, J. P., Barr, A. C., Bowdon, R. D., Hall, M. C., Paula, S., Capobianco, B. M., & Lim, S. (2022). Scientific Research Identity Development Need Not Wait Until College: Examining the Motivational Impact of a Pre-college Authentic Research Experience. *Research in Science Education*, *52*(5), 1481–1496. https://doi.org/10.1007/s11165-021-09994-6

Edi Supartawan, N., Bagus Nyoman Sudria, I., & Luh Putu Manik Widiyanti, N. (2021). Pengembangan Perangkat Pembelajaran Ipa Smp Pada Topik Sistem Organisasi Kehidupan Dengan Pendekatan Saintifik. *Jurnal Matematika*, *15*(1), 81–95. https://doi.org/10.23887/wms.v15i1.19272

Esparza, D., Wagler, A. E., & Olimpo, J. T. (2020). Characterization of instructor and student behaviors in CURE and non-CURE learning environments: Impacts on student motivation, science identity development, and perceptions of the laboratory experience. *CBE Life Sciences Education*, *19*(1). https://doi.org/10.1187/cbe.19-04-0082

Frederick, A., Grineski, S. E., Collins, T. W., Daniels, H. A., & Morales, D. X. (2021). The emerging STEM paths and science identities of hispanic/latinx college students: Examining the impact of multiple undergraduate research experiences. *CBE Life Sciences Education*, *20*(2), 1–10. https://doi.org/10.1187/cbe.20-08-0191

Hasbullah. (2015). *Dasar-dasar Ilmu Pendidikan (Umum dan Agama Islam)*. Raja Wali Pers.

Henry, J., Hernalesteen, A., & Collard, A. S. (2021). Teaching Artificial Intelligence to K-12 Through a Role-Playing Game Questioning the Intelligence Concept. *KI-Kunstliche Intelligenz*, *35*(2), 171–179. https://doi.org/10.1007/s13218-021-00733-7

Huvard, H., Talbot, R. M., Mason, H., Thompson, A. N., Ferrara, M., & Wee, B. (2020). Science identity and metacognitive development in undergraduate mentor-teachers. *International Journal of STEM Education*, *7*(1). https://doi.org/10.1186/s40594-020-00231-6

Indrianto, N., & Nurul Fatmawati, D. (2020). Teacher Skills in Classroom Management in Thematic Learning in Elementary Schools/Keterampilan Guru dalam Pengelolaan Kelas pada Pembelajaran Tematik di Madrasah Ibtidaiyah. *Journal AL-MUDARRIS*, *3*(1), 15. https://doi.org/10.32478/al-mudarris.v3i1.335

Jufrida, J., Basuki, F. R., Rinaldo, F., & Purnamawati, H. (2020). Analisis Permasalahan Pembelajaran Ipa: Studi Kasus Di Smpn 7 Muaro Jambi. *Jurnal Pendidikan Sains (JPS)*, *8*(1), 50. https://doi.org/10.26714/jps.8.1.2020.50-58

Jundu, R., Tuwa, P. H., & Seliman, R. (2020). Hasil Belajar IPA Siswa SD di Daerah Tertinggal dengan Penerapan Model Pembelajaran Inkuiri Terbimbing The Influence to Science Learning Results for Elementary School Students in Underdeveloped Regions with The Implementation of Guided Inquiry Model. *Scholaria: Jurnal Pendidikan Dan Kebudayaan*, *10*(2), 103–111. Retrieved from https://ejournal.uksw.edu/scholaria/article/view/2779

Komariyah, L., & Syam, M. (2022). Pengaruh model pembelajaran inkuiri terbimbing (guided inquiry) dan motivasi terhadap hasil belajar Fisika siswa. *Saintifika, 18*(1), 16-16. Retrieved from http://saintifika.or.id/index.php/saintifika/article/view/123

Nurwahidah, I. (2020). Kemampuan Keterampilan Dasar Mengajar Mahasiswa Calon Guru Ipa Program Studi Pendidian Ipa. *EduTeach : Jurnal Edukasi Dan Teknologi Pembelajaran*, *1*(2), 22–33. https://doi.org/10.37859/eduteach.v1i2.1957

Ozkan, G., & Umdu Topsakal, U. (2021). Exploring the effectiveness of STEAM design processes on middle school students' creativity. *International Journal of Technology and Design Education*, *31*(1), 95–116. https://doi.org/10.1007/s10798-019-09547-z

Pisl, V., Volavka, J., Chvojkova, E., Cechova, K., Kavalirova, G., & Vevera, J. (2021). Dissociation, cognitive reflection and health literacy have a modest effect on belief in conspiracy theories about covid-19. *International Journal of Environmental Research and Public Health*, *18*(10). https://doi.org/10.3390/ijerph18105065

Ragab, A. H. M., Noaman, A. Y., Madbouly, A. I., Khedra, A. M., & Fayoumi, A. G. (2018). Essam: an Assessment Model for Evaluating Students Satisfaction in E-Learning Environments. *IJAEDU-International E-Journal of Advances in Education*, *4*(11), 175–184. https://doi.org/10.18768/ijaedu.455619

Ross, J., Sinclair, C., Knox, J., Bayne, S., & Macleod, H. (2014). Teacher Experiences and Academic Identity: The Missing Components of MOOC Pedagogy. *MERLOT Journal of Online Learning and Teaching*, *10*(1), 57–69. Retrieved from https://jolt.merlot.org/vol10no1/ross_0314.pdf

Roth, T., Conradty, C., & Bogner, F. X. (2021). Testing Creativity and Personality to Explore Creative Potentials in the Science Classroom. *Research in Science Education*. https://doi.org/10.1007/s11165-021-10005-x

Safirah, R., Rachmadiarti, F., & Ibrahim, M. (2022). Validitas perangkat pembelajaran daring ipa berbasis model inkuiri terbimbing untuk melatihkan literasi sains siswa SMP. *Jurnal Education and Development Institut*, *10*(1), 341–346. Retrieved from https://journal.ipts.ac.id/index.php/ED/article/view/3459

Septaria, K., & Dewanti, B. A. (2021). Implementation of project based learning on student reasoning on COVID-19 disaster mitigation. *Prisma Sains: Jurnal Pengkajian Ilmu dan Pembelajaran Matematika dan IPA IKIP Mataram,* *9*(1), 20-27. https://doi.org/10.33394/j-ps.v9i1.2951

Septaria, K., Dewanti, B. A., & Habibbulloh, M. (2019). Implementasi Metode Pembelajaran Spot Capturing Pada Materi Pemanasan Global untuk Meningkatkan Keterampilan Proses Sains. *Prisma Sains : Jurnal Pengkajian Ilmu Dan Pembelajaran Matematika Dan IPA IKIP Mataram*, *7*(1), 27. https://doi.org/10.33394/j-ps.v0i0.1379

Septaria, K., Fatharani, A., & Yasa, A. D. (2022). COVID-19 is a Conspiracy Disease? Diagnostic Mental Models and Students' Cognitive Abilities. *Jurnal Penelitian Dan Pengkajian Ilmu Pendidikan: E-Saintika*, *6*(1), 18–32. https://doi.org/10.36312/esaintika.v6i1.561

Sezer, B., & Yilmaz, R. (2019). Learning management system acceptance scale (LMSAS): A validity and reliability study. *Australasian Journal of Educational Technology*, *35*(3), 15–30. https://doi.org/10.14742/ajet.3959

Suarbawa, I. P. (2019). Penerapan Model Pembelajaran Kooperatif Tipe STAD (Student Teams Achievement Division) Untuk Meningkatkan Hasil Belajar Mata Pelajaran Desain Grafis Vektor. *Jurnal Pedagogi Dan Pembelajaran*, *2*(1), 57. https://doi.org/10.23887/jp2.v2i1.17608

Subarkah, A. R. (2018). No Title空間像再生型立体映像の研究動向. *Nhk技研*, *151*(2), 10–17.

Sugiyono. (2015). *Metode Penelitian Kuantitatif, Kualitatif dan R&D*. Alfabeta.

Sulisworo, D., Drusmin, R., Kusumaningtyas, D. A., Handayani, T., Wahyuningsih, W., Jufriansah, A., Khusnani, A., & Prasetyo, E. (2021). The Science Teachers' Optimism Response to the Use of Marker-Based Augmented Reality in the Global Warming Issue. *Education Research International*, *2021*. https://doi.org/10.1155/2021/7264230

Thuneberg, H. M., Salmi, H. S., & Bogner, F. X. (2018). How creativity, autonomy and visual reasoning contribute to cognitive learning in a STEAM hands-on inquiry-based math module. *Thinking Skills and Creativity*, *29*(April), 153–160. https://doi.org/10.1016/j.tsc.2018.07.003

Vincent-Ruz, P., & Schunn, C. D. (2018). The nature of science identity and its role as the driver of student choices. *International Journal of STEM Education*, *5*(1). https://doi.org/10.1186/s40594-018-0140-5

Woods, S., & Hsu, Y. C. (2020). Making Spaces for STEM in the School Library. *TechTrends*, *64*(3), 388–394. https://doi.org/10.1007/s11528-019-00460-9

Yudhistira, R., Rifaldi, A. M. R., & Satriya, A. A. J. (2020). Pentingnya Perkembangan Pendidikan Di Era Modern. In *Seminar Nasional Bahasa Dan Sastra Indonesia*. Retrieved from https://jurnal.umj.ac.id/index.php/SAMASTA/article/view/7222