

The Impact of Collaborative Problem-Solving Learning on Scientific Reasoning and the Halal Lifestyle Awareness of Class VIII Students at MTsN 2 Subang in Studying the Human Digestive System

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Article Info	Abstract
Received: 17-01-2025 Revised: 25-02-2025 Accepted: 26-02-2025 Published: 28-02-2025 Keywords: Collaborative Problem Solving (CPS); Scientific Reasoning; Halal Lifestyle.	Problems related to low scientific reasoning abilities and the application of halal lifestyle values among class VIII students on the subject of the human digestive system prompted the implementation of this research. The research aims to measure the effect of Collaborative Problem Solving (CPS)-based teaching on improving scientific reasoning and practicing halal lifestyles. The intervention was implemented through a pre-experimental one-group pretest-posttest design involving 30 MTsN 2 Subang students, with data collected through essay tests before and after the intervention and analyzed using the paired sample t-test. The results of the analysis show a significant increase in scientific reasoning scores and implementation of a halal lifestyle (significance value < 0.05), confirming the effectiveness of CPS in facilitating in-depth understanding of the human digestive system material. The discussion reveals that the CPS method triggers students' active involvement in collaborative problem solving, contributing to improving critical thinking skills and integrating halal values. These findings provide important implications for the development of innovative learning strategies as well as the integration of scientific values and halal ethics in the educational curriculum.

Info Artikel	Abstrak
Kata Kunci: Collaborative Problem Solving (CPS); Penalaran Ilmiah; Gaya Hidup Halal.	Permasalahan terkait rendahnya kemampuan penalaran ilmiah dan penerapan nilai gaya hidup halal di kalangan siswa kelas VIII pada materi sistem pencernaan manusia mendorong dilaksanakannya penelitian ini. Penelitian bertujuan mengukur pengaruh pengajaran berbasis Collaborative Problem Solving (CPS) terhadap peningkatan nalar ilmiah dan pengamalan pola hidup halal. Intervensi diterapkan melalui desain pra-eksperimental one-group pretest-posttest yang melibatkan 30 siswa MTsN 2 Subang, dengan data dikumpulkan melalui tes esai sebelum dan sesudah intervensi serta dianalisis menggunakan uji paired sample t-test. Hasil analisis menunjukkan peningkatan signifikan skor penalaran ilmiah dan penerapan gaya hidup halal (nilai signifikansi < 0,05), menegaskan efektivitas CPS dalam memfasilitasi pemahaman mendalam terhadap materi sistem pencernaan manusia. Pembahasan mengungkapkan bahwa metode

CPS memicu keterlibatan aktif siswa dalam pemecahan masalah secara kolaboratif, berkontribusi pada peningkatan keterampilan berpikir kritis dan pengintegrasian nilai-nilai halal. Temuan ini memberikan implikasi penting bagi pengembangan strategi pembelajaran inovatif serta integrasi nilai keilmuan dan etika halal dalam kurikulum pendidikan.



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INTRODUCTION

A quality future generation can only be created through holistic education that is relevant to the demands of the times. In this era of globalization, students must be equipped with broader skills and understanding to face the dynamics of the modern world. One important aspect in education is the application of scientific reasoning that supports critical thinking skills (Khatriya, 2017). In addition, instilling halal lifestyle values is also an important part of forming students with character. One of the materials in the science curriculum that can support these two aspects is the human digestive system. This material provides a deep understanding of how the human body processes food and nutrients, which is relevant to building health awareness and spirituality (Ganda & Panjaitan, 2016).

However, traditional teacher-centered learning approaches often become an obstacle in helping students understand complex material, such as the human digestive system (Ika Sukmawati, 2021). This method tends to involve students less actively, thus limiting their ability to develop scientific reasoning and understand the application of a halal lifestyle in depth (Abdullah, Ludfi, & Fatihah, 2024). In this case, a learning method is needed that not only makes it easier for students to understand the material but also encourages their active involvement in the learning process. One approach that has the potential to answer this challenge is collaborative problem solving (Damayanti, 2018).

According to Dillenbourg, (2007), Collaborative Problem Solving is a form of cooperation between two or more people to achieve a common goal in solving a problem. This approach allows students to work in teams, share ideas, and discuss solutions to certain problems. This not only trains critical thinking skills, but also deepens students' understanding of the subject matter, such as the human digestive system (Mulyani, 2022). Furthermore, CPS provides space for students to develop communication, cooperation, and collective decision-making skills. In this way, students can understand scientific concepts more deeply, while at the same time relating them to halal lifestyle values that are relevant in everyday life (Sulistyowaty, Kusumah, & Priatna, 2019).

Although CPS offers great potential in supporting scientific reasoning and the implementation of a halal lifestyle, research on the effectiveness of this method, especially on grade VIII students of MTsN 2 Subang, is still very limited. Given the importance of the human digestive system material in building students' understanding of health and ethics, an in-depth study is needed to evaluate the influence of CPS on these two aspects (Laal & Laal, 2012). This research is expected to be able to provide a significant contribution to the development of more effective learning methods, so that students not only understand the subject matter academically but can also apply it in everyday life in accordance with sharia values (Nahdi, 2017).

Elvina (2022) investigated the enhancement of students' problem-solving skills through Collaborative Problem Solving (CPS) aided by interactive media such as Phet. Their study revealed that integrating digital tools with CPS significantly improved students' analytical abilities and deepened their understanding of scientific concepts. This research emphasizes the capacity of CPS to foster critical thinking and collaborative learning, providing a strong argument for its broader application in science education.

Similarly, Herdian, Syaban, and Lestari (2015) examined the impact of CPS on developing mathematical connectivity among middle school students. Their findings indicated that the CPS model not only strengthened students' abilities to establish logical connections in mathematics but also enhanced their overall reasoning skills. This study contributes to the growing body of evidence that CPS is an effective pedagogical strategy across various disciplines, underlining its potential to cultivate cognitive skills that are transferable to complex scientific material.

In addition, Ika Sukmawati (2021) developed a web-based Collaborative Problem Solving Inventory (CPSI) to assess students' collaborative skills in problem solving within biology education. This work provided a reliable measurement tool for evaluating the collaborative dimensions of CPS learning, reinforcing the importance of both cognitive and social skills in educational settings. Collectively, these studies underscore the multifaceted benefits of CPS improving critical thinking, problem-solving, and collaborative abilities which directly supports the rationale of the current research.

Building on previous research, the present study aims to test the effect of Collaborative Problem Solving (CPS) teaching on students' scientific reasoning and the application of a halal lifestyle to the human digestive system material, particularly among grade VIII students of MTsN 2 Subang. The CPS method is considered capable of

enhancing students' ability to think critically and solve problems collaboratively, which is essential for mastering science material (Takaria, 2018). Moreover, this approach is expected to foster greater awareness and practical application of a halal lifestyle as an integral part of character education based on Islamic values. By integrating scientific knowledge with religious values, the study seeks to provide new insights into the effectiveness of CPS in promoting both academic achievement and moral development (Sopyan Hadi, 2021).

The results of this study are expected to contribute to the development of more innovative and contextual teaching methods in science education (Utami, 2020). Through CPS learning, students not only understand the concept of the human digestive system, but can also relate it to the importance of a halal lifestyle, especially in choosing food that is in accordance with sharia principles. Awareness of halal food is now a major concern in society, both in packaged products and food served in restaurants (Khoiri, 2017). This shows that the implementation of a halal lifestyle is not only religiously relevant but also provides a guarantee of convenience and security for consumers (Elvina et al., 2022).

Integration of Islamic values into students' daily lives, including halal lifestyle, is an important goal in education. Most people now prefer products that have halal certification as a form of trust in the quality and halalness of the product (Afif, 2022). This research is expected to strengthen students' understanding of the importance of a halal lifestyle, while encouraging the development of teaching methods that are not only oriented towards academic achievement, but also towards the formation of students' character based on sharia values. Thus, science education is not only a means of transferring knowledge, but also a tool for building moral and religious awareness (Heryandi, 2022).

Scientific reasoning is the ability to think systematically and logically which is very important in solving problems using structured scientific methods. This ability involves several important steps, such as evaluating facts, formulating predictions and hypotheses, and defining and controlling variables in experiments. Furthermore, scientific reasoning includes designing and conducting experiments, collecting data accurately, analyzing the results, and drawing conclusions based on existing evidence (Mahardika et al., 2023). This process not only trains students in critical thinking, but also provides a deeper understanding of various scientific phenomena through an evidence-based approach, which is very important for developing analytical skills and adapting to changes in various

contexts. Thus, scientific reasoning becomes the basis for the development of knowledge and informed decision-making in the fields of science and technology (Koenig, 2012).

In the application of measuring scientific reasoning ability and the application of halal lifestyle, the scientific reasoning test consists of five indicators, namely: Serial ordering, Class inclusion reasoning, Correlational reasoning, Theoretical reasoning, and Functionality reasoning (Koenig et al., 2012). In addition, halal lifestyle is also an important aspect when considering the effects of food on the digestive system. Halal lifestyle has a broad influence and covers all areas of life. And of course we have to start from the small things like how to choose halal food (Ali, 2016). Halal lifestyle involves choosing food that is in accordance with the principles of religion and Islamic law, including permissible food ingredients and processing methods that meet Halal requirements. Therefore, in this context, it is necessary to apply the collaborative problem solving learning model to the material on the human digestive system in class VIII MTsN 2 Subang, this material is very relevant in improving a student's scientific reasoning in following a halal lifestyle by choosing and consuming foods related to the digestive system.

RESEARCH METHODS

This study employs a quantitative approach using a pre-experimental one-group pretest-posttest design to assess the impact of Collaborative Problem-Solving (CPS) learning on students' scientific reasoning and halal lifestyle awareness in the context of the human digestive system. The population comprises all grade VIII students at MTsN 2 Subang, from which a purposive sample of 30 students is selected, reflecting the study's focus and available resources. The research process is divided into sequential stages: a pretest is administered to evaluate baseline abilities, followed by the CPS intervention, and finally a posttest is conducted to measure changes in both scientific reasoning and halal lifestyle application. Data are collected using an integrated essay test, where identical questions are employed to simultaneously assess both variables. To ensure the validity and reliability of the instrument, expert reviews and pilot studies are conducted, confirming its construct validity and internal consistency. The collected data are then analyzed using a paired t-test (Santoso, 2009), which statistically determines the differences in students' performance before and after the learning intervention (Munte, Jailani, & Siregar, 2023).

RESULTS AND DISCUSSION

Integrating Scientific Reasoning and Halal Values: Evaluating the Impact of Collaborative Problem-Solving on Digestive System Learning

Tahap This section presents the results of the research data analysis aimed at measuring changes in scientific reasoning values in the implementation of a halal lifestyle before and after the implementation of the Collaborative Problem Solving (CPS) learning method. This study specifically highlights students' ability to think logically, systematically, and critically about scientific concepts relevant to the implementation of a halal lifestyle, such as the mechanism of digestion, the relationship between halal food consumption, and health.

Data analysis was conducted by comparing the pretest and posttest results obtained through an essay test that measures students' scientific reasoning abilities and their understanding of the principles of a halal lifestyle. Differences in scores before and after the learning intervention were analyzed using statistical tests, such as paired t-tests, to determine the significance of the increase in students' abilities. The results showed a significant increase in scientific reasoning scores after the implementation of CPS learning. This shows that the CPS method is not only effective in improving students' understanding of the human digestive system material, but also helps them internalize the values of a halal lifestyle more deeply.

Table 1. Scientific reasoning scores before and after participating in learning with CPL

No.	BeforeCPL Learning	AfterCPL Learning
1	75	85
2	82	92
3	70	80
4	80	90
5	68	78
6	70	80
7	85	95
8	55	75
9	60	70
10	68	78
11	72	82
12	80	92
13	65	75
14	60	70
15	50	70
16	70	90
17	55	75
18	50	70

19	50	70
20	68	82
21	70	82
22	70	85
23	70	85
24	78	90
25	55	78
28	52	72
27	78	92
28	75	95
29	67	78
30	80	95

Integrating Scientific Reasoning and Halal Lifestyle Values: Unveiling the Impact of Collaborative Problem Solving in Digestive System Education

According to S. Saptono (2013), Scientific reasoning is one of the important skills that must be developed in science learning. This aims to enable students to understand the relationship between food consumed, digestive mechanisms, nutrient absorption, and its impact on health. By studying these concepts through a scientific approach, students not only gain theoretical knowledge but are also able to apply it in everyday life to improve the quality of health and a better lifestyle (Herdian, 2015).

The results of this study were analyzed using a series of statistical tests to ensure the validity and reliability of the data, as well as to test the proposed hypothesis. The analysis began with a normality test, which was conducted to check whether the data distribution met the normal assumption. This normality test used the Kolmogorov-Smirnov and Shapiro-Wilk methods, where both tests provide comprehensive results on the initial data distribution. The results of this test are very important as a prerequisite before proceeding to the next stage of statistical analysis, because the validity of hypothesis testing is highly dependent on the fulfillment of these assumptions.

In addition to the normality test, this study also uses paired samples test and hypothesis testing with the t-test method. The paired samples test is used to compare two sets of paired data, namely data before and after the learning intervention. This analysis helps evaluate the effectiveness of learning by identifying significant differences in the results obtained by students. In addition, descriptive statistics such as maximum value, minimum value, average (mean), and standard deviation are also presented to provide an initial overview of the characteristics of the data. This data presentation not only strengthens the statistical argument but also makes it easier for researchers and educators

to interpret the results. Overall, the analytical approach used in this study provides a strong foundation for drawing valid conclusions about the effectiveness of the learning applied.

Hypothesis Making

- Ho (null hypothesis)

There is no difference in students' scientific reasoning abilities and application of halal lifestyle before and after participating in collaborative problem solving learning.

- H1 (alternative hypothesis)

There are differences in students' scientific reasoning abilities and application of halal lifestyle before and after participating in collaborative problem solving learning. (Budiana, Purwanto, Milataka, & Hidayati, 2008)

Table 2. Correlation relationships

Coefficient	The Power of Relationships
0.00	No connection
0.01-0.09	Relationships are less meaningful
0.10-0.29	Weak Link
0.30-0.49	Moderate relationship
0.50-0.69	Strong Relationship
0.70-0.89	Very strong relationship
>0.90	Near perfect relationship

Table 3. Test of Normality

	Kolmogorov-Smirnov ^a			Shapiro-Wilk		
	Statistic	df	Sig.	Statistic	df	Sig.
Sebelum_CPS	.149	30	.089	.934	30	.064
Sesudah_CPS	.138	30	.154	.923	30	.033

a. Lilliefors Significance Correction

Based on the results of the Test of Normality, the significance value (sig) in the Kolmogorov-Smirnov and Shapiro-Wilk tests shows that the data before and after Collaborative Problem Solving (CPS) learning on scientific reasoning and the application of students' halal lifestyles is > 0.05. This indicates that the data is normally distributed, thus fulfilling one of the basic assumptions for conducting parametric statistical analysis. This normal distribution is important in the context of data processing because it allows the use

of advanced statistical tests, such as the paired t-test, to test hypotheses more validly and reliably.

After ensuring that the data is normally distributed, the next step is to process the data to test the research hypothesis. This hypothesis test aims to evaluate the effect of CPS learning on improving scientific reasoning and the application of a halal lifestyle in students. The data analysis process was carried out by comparing the pretest and posttest scores using a paired t-test. The results of this test are expected to provide empirical evidence of whether CPS learning has a significant effect on improving students' abilities, both in scientific thinking and in applying halal lifestyle values. Thus, this analysis not only provides validation of the CPS method as an effective learning strategy but also supports its practical implications in the context of value-based education.

Table 4. Paired sample statistics

		Mean	N	Std. Deviation	Std. Error Mean
Pair 1	Sebelum_CPS	67.6000	30	10.37769	1.89470
	Sesudah_CPS	81.7000	30	8.43290	1.53963

The results of the Paired Samples Statistics table analysis show a significant increase in the average score in learning outcomes of scientific reasoning and the application of halal lifestyle before and after Collaborative Problem Solving (CPS) learning. Before CPS learning, the average score of students' scientific reasoning and application of halal lifestyle was at 67.6000, which reflects the level of students' initial understanding of the material being taught. After the implementation of CPS learning, the average score increased to 81.7000, which indicates a positive development in scientific reasoning abilities and the application of halal lifestyle.

This increase indicates that the CPS learning method is effective in encouraging students to think critically, collaborate in solving problems, and deepen their understanding of concepts. CPS not only improves scientific thinking skills through structured discussions and problem solving, but also supports the formation of positive behaviors, such as the application of halal lifestyle values in everyday life. These data provide empirical evidence that CPS learning is able to create a more active, interactive, and relevant learning environment for students, thereby helping them achieve better learning outcomes. This

also strengthens the importance of innovation in teaching methods that not only focus on academic achievement, but also shape attitudes and behaviors that are in accordance with positive values.

Next, the output display below shows the correlation between the two variables.

Table 5. Paired samples correlations

		N	Correlation	Sig.
Pair 1	Sebelum_CPS & Sesudah_CPS	30	.906	.000

The correlation results between the two variables show a Significance value (Sig) of 0.000, which means $\text{Sig} < 0.05$. This indicates a significant relationship between scientific reasoning scores and the application of halal lifestyle before the application of the Collaborative Problem Solving (CPS) method with the score after the application of the method. In other words, CPS has a real influence on improving scientific reasoning skills and the application of halal lifestyle in students.

To measure the strength of the relationship between the two variables, correlation analysis was used on the Paired Samples Correlation data, which produced a correlation value of 0.906. This value is in the range of > 90 , indicating a very strong and near perfect relationship between the two variables. Thus, these results confirm that the CPS method effectively contributes to strengthening the relationship between improving students' scientific reasoning and implementing a halal lifestyle. This is supported by the data in Table 2, which emphasizes the reliability of the relationship. These findings provide an empirical basis that CPS is a very effective learning approach to improving critical thinking skills and ethical values in the context of education.

To see the difference in scores before and after implementing CPS learning, see the image below.

Table 6. Paired sample Test

		Paired Differences					t	df	Sig. (2-tailed)
		Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference				
					Lower	Upper			
Pair 1	Sebelum_CPS - Sesudah_CPS	-14.10000	4.49022	.81980	-15.77668	-12.42332	-17.199	29	.000

Based on the results of the Paired Samples Test output analysis, the significance value (Sig) obtained is 0.000. This value is smaller than 0.05, indicating that the null hypothesis (H_0) is rejected, and the alternative hypothesis (H_1) is accepted. Thus, there is a significant difference in students' scientific reasoning abilities and application of halal lifestyles before and after the implementation of learning using the Collaborative Problem Solving (CPS) approach. This confirms that the CPS approach has a real impact on improving students' critical thinking skills in understanding scientific concepts as well as the application of halal lifestyle values to the human digestive system material.

These results strengthen the belief that the CPS approach is not only effective in improving students' academic understanding but is also able to integrate aspects of ethical values into learning. This significant difference reflects the success of the CPS method in creating a learning environment that encourages collaboration, exploration of ideas, and application of daily life values. Thus, the CPS approach can be a relevant strategy to be implemented more widely in learning, especially in developing students' scientific reasoning abilities while instilling important values such as a halal lifestyle. This provides important implications for educators in designing integrative and effective teaching methods for the needs of education in the modern era.

Descriptive Statistics provides an overview of the research data through the analysis of minimum, maximum, and average values. In this context, the Descriptive Statistics table helps explain the differences in students' scientific reasoning scores and implementation of a halal lifestyle before and after Collaborative Problem Solving (CPS) learning. The minimum score indicates the lowest achievement of students, while the maximum score reflects the highest achievement of students in both aspects measured. In addition, the average score provides an indication of the overall level of achievement of students in the

study. This data is very important to see how much change occurred after the CPS learning intervention was implemented.

The results of the analysis in this table can also show a significant increase in scientific reasoning scores and the implementation of a halal lifestyle after students participated in CPS learning. By comparing the average scores before and after the intervention, the positive impact of the collaborative learning approach on students' understanding can be seen, both in terms of scientific thinking and in implementing halal values in everyday life. This information provides in-depth insight for educators to evaluate the effectiveness of the CPS method, as well as encourage the development of learning strategies that can improve learning outcomes more optimally.

Table 7. Descriptive statistics

			Statistic	Std. Error
Sebelum_CPS	Mean		67.6000	1.89470
	95% Confidence Interval for Mean	Lower Bound	63.7249	
		Upper Bound	71.4751	
	5% Trimmed Mean		67.6667	
	Median		70.0000	
	Variance		107.697	
	Std. Deviation		10.37769	
	Minimum		50.00	
	Maximum		85.00	
	Range		35.00	
	Interquartile Range		17.00	
	Skewness		-.325	.427
	Kurtosis		-.905	.833
Sesudah_CPS	Mean		81.7000	1.53963
	95% Confidence Interval for Mean	Lower Bound	78.5511	
		Upper Bound	84.8489	
	5% Trimmed Mean		81.6111	
	Median		81.0000	
	Variance		71.114	
	Std. Deviation		8.43290	
	Minimum		70.00	
	Maximum		95.00	
	Range		25.00	
	Interquartile Range		15.00	
	Skewness		.131	.427
	Kurtosis		-1.227	.833

The Descriptive Statistics table shows a significant increase in students' scientific reasoning and halal lifestyle implementation scores before and after CPS learning. Before CPS implementation, students' minimum score was 50.00, while the maximum score reached 85.00, with an average of 67.6000 and a standard deviation of 10.37769. This reflects a significant variation in students' abilities related to scientific reasoning and halal lifestyle before the CPS learning intervention. This score indicates that some students still have limited understanding of the concepts taught, especially those related to the human digestive system and its relevance to a halal lifestyle.

After CPS learning was implemented, the scores showed a significant increase. The minimum score of students increased to 70.00, while the maximum score reached 95.00, with an average of 81.7000 and a smaller standard deviation of 8.43290. This increase in the average score indicates that CPS learning is able to strengthen students' abilities in scientific reasoning and the application of a halal lifestyle. In addition, the shrinking standard deviation indicates a more even distribution of abilities, reflecting that the CPS method helps reduce the gap in understanding between students. Thus, these results provide strong evidence that CPS learning is not only effective in improving students' cognitive abilities, but also in encouraging the application of halal lifestyle values in everyday life.

The current study's findings, which show a significant increase in average scores (from 67.60 to 81.70) and a decrease in score variability after implementing CPS learning, are consistent with previous research on the effectiveness of CPS. For instance, Elvina et al. (2022) demonstrated that CPS, when integrated with media tools, significantly enhanced students' problem-solving skills in natural science, while Herdian et al. (2015) found that CPS improved mathematical connections in middle school students. Unlike these studies that primarily focused on cognitive outcomes, the present research uniquely integrates the application of halal lifestyle values into the curriculum, thereby addressing both scientific reasoning and ethical development. This extension not only reaffirms CPS as an effective pedagogical method but also provides a more holistic educational approach by reducing performance disparities among students, as evidenced by the lower standard deviation, and by simultaneously promoting critical thinking and value-based behaviors.

CONCLUSION

Based on this study, it can be concluded that cooperative problem solving (CPS) learning has a significant effect on scientific reasoning and the application of halal lifestyle in class VIII MTsN 2 Subang in the context of human digestive system teaching materials. The results of this study indicate that CPS learning provides positive benefits for the development of students' skills in these two important aspects. This shows that CPS learning helps students develop scientific reasoning skills that are essential for understanding natural phenomena and creating scientific knowledge. In addition, CPS education also influences the implementation of a halal lifestyle in students. Students enrolled in CPS are more aware of the importance of halal values in food and daily lifestyle. They know how to connect the concept of the human digestive system with halal food

choices, understand the impact of halal food consumption on digestive health, and apply halal principles in everyday life.

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