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Guided Inquiry Assisted by E-Module Socio Scientific Issues Integrated Islamic Values in the Earth and Solar System material: Its Impact on Improving Students' Scientific Argumentation Skills

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Abstract: This study aims to determine the improvement in students' scientific argumentation skills through the application of the E-Module Socio scientific issues (SSI) Based on Islamic Values integrated with the Guided Inquiry learning model in Earth and Solar System lessons. A true experimental method was used in this study with a pretest-posttest control group design. All 255 students of class VII at one of the Madrasah Tsanawiyah (MTs) in Pekanbaru were the population of this study. Random sampling technique was used in this research, and the samples selected were 32 the seventh-grade students of class A as the experimental group taught by implementing Islamic Values integrated E-Module SSI assisted Guided Inquiry learning model and 33 students of class C as the control group taught by implementing conventional learning model. Collecting data was done by giving pretest and posttest to find out the increase of student scientific argumentation skills. The test data were analyzed by using independent sample t-test. The statistical test results with the assistance of SPSS 20 showed that the significant score 0.000 was lower than 0.05, so Ha was accepted and Ho was rejected. It meant that there was a significant difference of scientific argumentation skill increase between students taught by implementing Islamic Values integrated E-Module SSI assisted Guided Inquiry learning model and those who were taught by implementing conventional learning model on Earth and Solar System lesson at the seventh-grade of Madrasah Tsanawiyah.

Keywords: Guided Inquiry; Scientific Argumentation Skills; Socio Scientific Issues; E-Module; Islamic Values

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1. Introduction

Education plays a very important role in improving the quality of human resources (Ginting et al., 2022). So that it becomes an effort to achieve equity and increase student potential to achieve the desired quality of education (Wahyudi, 2022). In this context, learning activities are planned and organized systematically to bring individuals from ignorance to understanding, from incompetence to competence, and to help shape positive and characterful personalities (Khatimah et al., 2023). Thus, education becomes the main foundation in creating a generation that is intelligent, competitive, and ready to contribute to the development of the nation.

The learning process aims to optimize the potential of students to have the ability to live as individuals and members of a faithful, productive, creative, innovative, and affective society, and be able to make a positive contribution to the life of society, nation, state, and global civilization (Fikri et al., 2018). In order to achieve these goals, a pleasant learning environment plays an important role. Learning that is designed to be interesting and interactive can help students more easily understand important concepts in subjects, especially science, which require logical reasoning and a deep understanding of natural phenomena. With a pleasant approach, the process of internalizing concepts becomes more effective and encourages active student engagement in learning (Mahmudah, 2019).

The 21st century skills known as 4Cs namely creativity, critical thinking, communication and collaboration are important in preparing for a dynamic global era. Communication allows individuals to communicate effectively with others, both orally and in writing. Group discussions and presentations that can critically interpret allow students to communicate effectively so that they can convey their arguments. According to (Grooms et al., 2018) the focus of science curricula needs to be changed so that students can learn how to participate in scientific practices.

Scientific argumentation skills are the process of supporting a claim by focusing on the ability to express ideas and propositions about everyday scientific phenomena that are based on evidence and consistent with existing theories (Fakhriyah et al., 2021). Socioscientific Issues (SSI) in science learning can help improve students' scientific argumentation skills. SSI is a complex and controversial problem related to scientific principles and concepts in a social context. These socioscientific issues are very suitable to be used as a framework in inquiry-oriented and constructivist science learning because they can elevate the content and process

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of science as a crucial part of learning (Hidayat & Hidayati, 2024). In addition, science has a very close relationship with knowledge about Islam.

Based on the results of observations and interviews conducted by researchers to science teachers that science learning in schools has used several learning models but conventional learning models still dominate. The teaching materials used are printed books as a handbook and have not integrated science learning with Islamic values. The teacher also said that students' scientific argumentation skills were still very low because the efforts made by the teacher were not optimal. Students have difficulty in expressing arguments in writing and orally, this is due to a lack of understanding of the concept of the material. The problem that often occurs is the mismatch between the learning model applied with the needs and abilities of students. In addition, teaching materials in the form of SSI e-modules integrated with Islamic values have not been applied at the school.

Research by (Calik & Wiyarsi, 2024) which states that only the duration of implementation is a significant moderator in predicting students' scientific literacy, along with SSI-based intervention studies. This finding is reinforced by (Duschl & Bybee, 2014) shows that the low level of scientific argumentation skills among secondary school students is directly related to their lack of involvement in inquiry-based activities and lack of exposure to socio-scientific topics in science education. Therefore, it is important for the learning process to provide broader opportunities for students to actively participate in inquiry activities and understand socio-scientific issues relevant to their daily lives, so that their scientific reasoning skills can improve significantly.

Study by (Martinez, S., Johnson, D., & Perez, 2021) highlights that the use of educational technology such as e-modules in SSI learning can significantly improve student engagement and learning outcomes. However, most schools in developing regions still use conventional teaching materials that are not responsive to 21st-century learning needs and local values. This is an important gap that must be filled in order to bridge educational technology with the integration of cultural and religious values in science learning.

The guided inquiry learning model has the potential to improve students' ability to learn actively, so that the results can be relied upon and maintained over a long period of time. The learning context using the guided inquiry learning model can raise a pro-con issue regarding science and the community environment or can be referred to as Socio Scientific Issues (SSI) (Roiefah et al., 2021). The socioscientific approach can be applied by involving more active participation from students, and

this approach is almost similar to a problem-based approach, especially in learning that uses contextual problems (Putri & Miterianifa, 2023).

Conceptual understanding of risk (knowledge necessary to discuss or deal with risk situations (risk competence), scientific knowledge necessary to understand risk (knowledge in science), and knowledge necessary to understand the causes and effects of risk (knowledge about science) (Morris et al., 2023). Not only does it combine the main components emphasized in risk education, but it also contextualizes these components in SSI education, demonstrating its strong potential for application in science education (Lee et al., 2024).

In science education, students are expected not only to acquire scientific knowledge but also to understand socio-scientific issues in the context of their social community and to recognize the order of the universe as a manifestation of the power of Allah SWT (Azizah et al., 2025). Teaching materials in the form of e-modules can help students measure and monitor their learning abilities and intensity. The use of modules is not limited by location or time but depends on the student's ability to use the module (Laili et al., 2019). Limitations in terms of references and teaching materials are the main obstacles related to facilities and equipment (Purwati, 2019).

One of the e-modules that can improve students' skills in making scientific argumentation is an e-module that focuses on Socio-Scientific Issues (SSI). E-modules are specifically and meticulously designed based on the individual comprehension levels of students, with the aim of encouraging students to learn in accordance with their potential (Sidiq & Najuah, 2020). According to (Utama & Zulyusri, 2022) e-modules are print-based innovations that can be accessed via smartphones or personal computers (PCs).

SSI e-modules integrated with Islamic values can also assist teachers in providing more effective guidance and increasing student participation in the learning process. Science learning integrated with Islamic values aims to encourage students to study science as a subject that cannot be separated from faith or sharia law (Zarkasih et al., 2019); Diniya, et al., 2025). Thus, students can develop better scientific argumentation skills and improve their learning achievement. One of the topics taught in the independent curriculum is about the earth and solar system.

Earth and solar system material can be linked to socioscientific issues to improve students' scientific argumentation skills. This strategy involves students in data analysis, reasoning about socioscientific issues, and providing working models that describe the theoretical and conceptual relationships among psychological,

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sociological, and developmental factors in SSI and science education (Zeidler et al., 2005).

Research conducted by (Siska et al., 2020) entitled "Application of Socioscientific Issues-based Learning to Improve Scientific Argumentation Skills". The similarity between this research and the research to be carried out is that both apply SSI to improve students' scientific argumentation skills. However, the difference lies in the learning model and learning resources used. The research by Siska et al. has not integrated the guided inquiry model and has not utilized SSI-based e-modules integrated with Islamic values. The research gap from previous studies is the absence of integration between the SSI approach, the guided inquiry model, and the reinforcement of Islamic values in a comprehensive learning package. Therefore, this study offers a new innovation by developing SSI-based learning combined with the guided inquiry model and e-modules integrated with Islamic values, to provide a more comprehensive impact on improving students' scientific argumentation skills.

2. Method

The research method used was a true experiment. This experiment was a classic and conventional model that used a random assignment (R) procedure divided into two groups, namely (A and B) (Creswell, 2013). The research design used was a pretest-posttest control group design. This design was chosen because it provides strong control over external variables through random assignment procedures, allowing the results to be interpreted more objectively. In the context of this study, this design is highly relevant as it aims to determine the improvement in students' scientific argumentation skills resulting from the implementation of the Guided Inquiry learning model assisted by e-modules integrated with Islamic values, compared to the conventional learning model. The selection of the Guided Inquiry model is based on recent findings indicating that this approach is effective in enhancing students' scientific and argumentative thinking skills, particularly in the context of science education (Yanti, D. N., Ikhsan, J., & Wiyarsi, 2023).

The population of this study was all 255 seventh-grade students at one of the MTs in Pekanbaru. The sampling technique used random sampling, resulting in the selection of Grade 7A as the experimental class with 32 students and Grade 7C as the control class with 33 students. The experimental group received instruction using the Guided Inquiry model assisted by an e-module integrated with Islamic values, while the control group received conventional instruction. Scientific argumentation skills data were collected through an essay test based on the Toulmin Argumentation Pattern (TAP) framework, which includes claim, data, justification, backing, and

rebuttal. This instrument has been validated by experts and has proven effective in measuring students' scientific argumentation skills (Yanti, D. N., Ikhsan, J., & Wiyarsi, 2023).

Data analysis techniques were carried out using n-gain tests, normality tests, homogeneity tests, and hypothesis tests. The n-gain test is conducted by calculating the difference between pretest and posttest scores. The improvement in students' ability to present scientific arguments after participating in the guided inquiry learning model with the assistance of the SSI e-module integrated with Islamic values is calculated using normalized achievement scores, which are calculated based on the formula developed by Hake 1999 in (Permana, 2018):

$$\langle g \rangle = \frac{(S_{post}) - (S_{pre})}{S_{\max} - (S_{pre})}$$

Description:

g = Average normalized gain score

S_{post} = The average score of the final test obtained by students

S_{pre} = The average score of the initial test obtained by students

S_{max} = Maximum Score

This formula compares the actual increase in student scores (Posttest - Pretest) with the maximum possible increase in scores (Maximum - Pretest). The results indicate how effective the learning process is in improving student understanding compared to the maximum potential for improvement. The effectiveness of learning is based on the difference between the pretest and posttest scores relative to the maximum score. The interpretation of the gain value is based on the following categories: high ($g > 0.7$), moderate ($0.3 \leq g \leq 0.7$), and low ($g < 0.3$).

Table 1 N-Gain Score Categories

Score (g)	Criteria
$\langle g \rangle \geq 0,7$	High
$0,3 \leq \langle g \rangle < 0,7$	Medium
$\langle g \rangle < 0,3$	Less

Source: Hake 1999 in (Permana, 2018)

Next, normality and homogeneity tests were conducted to ensure that the data met the assumptions of parametric analysis. After that, hypothesis testing was conducted using an independent sample t-test with the help of SPSS 20 to determine whether there was a significant difference in the improvement of scientific

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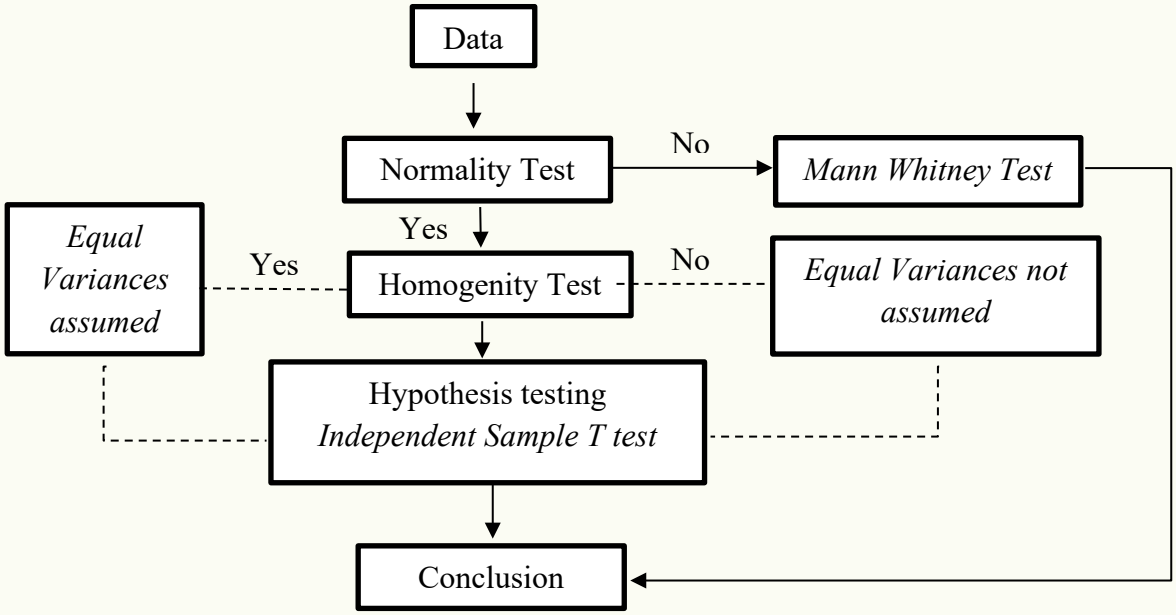
argumentation skills between the two groups. This method is generally used in experimental educational research to test the effectiveness of treatments. With this approach and analysis, the research can provide a valid and reliable picture of the impact of innovative learning models on the improvement of students' argumentative skills, while also supporting the integration of Islamic values into the science learning process in a meaningful way.

The data processing flow for testing the hypothesis regarding the application of a guided inquiry learning model assisted by integrated SSI e-modules with Islamic values to improve students' scientific argumentation skills in earth and solar system material is shown in Figure 3.1.



(Permana, 2018)

Figure 1 Hypothesis Submission

3. Result and Discussion

Implementation Guided Inquiry assisted by E-Module SSI Integrated Islamic Values

This study was conducted in five meetings including the implementation of pretest and posttest. The experimental class was given treatment in the form of applying the Guided Inquiry learning model assisted by the SSI e-module integrated with Islamic values, while the control class was given treatment in the form of

applying a conventional learning model. Observations were made to determine the implementation of using the Guided Inquiry learning model carried out by educators and students in the experimental class. Researchers were assessed by 1 observer using an observation sheet for 3 meetings. The observation sheet of the activities of educators and students includes 6 stages, namely orientation, formulating problems, formulating hypotheses, collecting data, testing hypotheses and formulating conclusions. The following is a diagram of the implementation of the Guided Inquiry learning model for educators for 3 meetings.

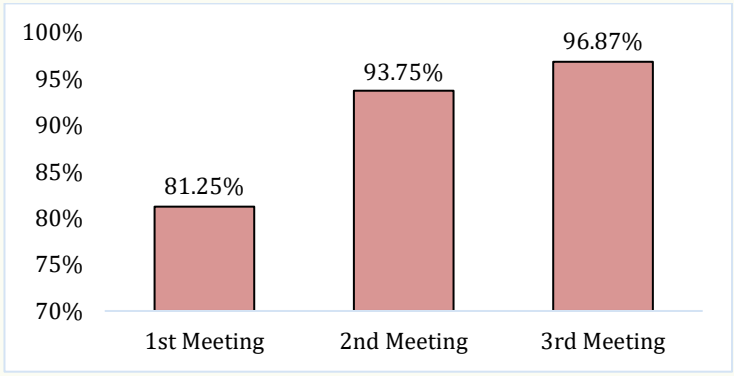


Figure 1. Diagram of Implementation of Guided Inquiry Model assisted by E-Module SSI Integrated Islamic Values by educators

For the implementation of the guided inquiry learning model, after obtaining the results of data analysis of observations of teacher activity activities at 3 meetings, a percentage of 81.25%, 93.75%, and 96.87% was obtained with an overall average of 90.62% which indicates that the learning process carried out by educators by applying the guided inquiry learning model assisted by the SSI e-module integrated with Islamic values, almost all activities are well implemented.

The following is a diagram of the implementation of the Guided Inquiry learning model by students for 3 meetings.

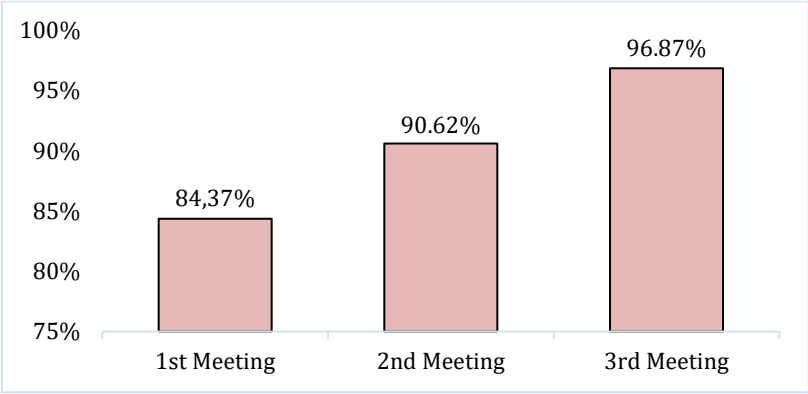


Figure 2. Diagram of Implementation of Guided Inquiry Model assisted by E-

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Module SSI Integrated Islamic Values by educators

Based on the diagram in Figure 2, it can be seen that the implementation of the Guided Inquiry model carried out by students at each meeting has increased. At the first meeting the average percentage of implementation was 84.37%, at the second meeting the average percentage of implementation was 90.62%, and at the third meeting the percentage of implementation was 96.87%. The increase in the value of the implementation of the Guided Inquiry learning model at each meeting is because students are familiar with all the activities carried out at the previous meeting, so that at the third meeting the learning runs smoothly and in accordance with the lesson plan.

Improvement of Students' Scientific Argumentation Skills

The results of the pretest and posttest of scientific argumentation skills produced by students can be seen the improvement of students' scientific argumentation skills through the calculation of the average normalized gain score <g>. Based on the results of the basic calculation analysis of the improvement of scientific argumentation skills contained in appendix C3, it can be made in the form of diagrams such as Figure 3 to see changes easily.

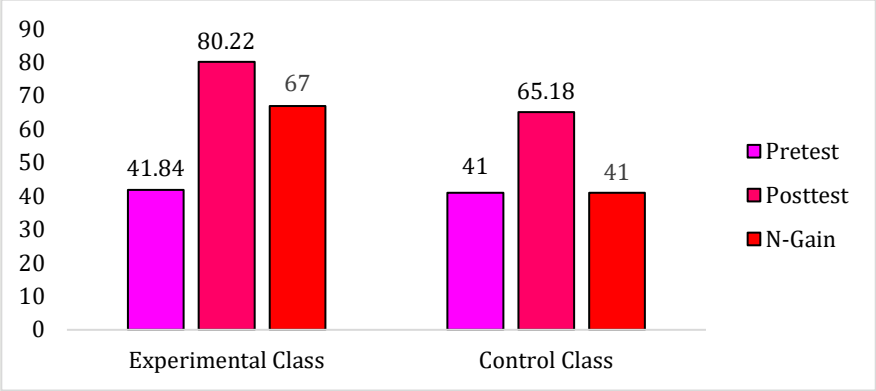

Figure 3. Diagram of the average pretest and posttest scores of experimental and control classes

Based on the pre-test data, it can be seen that the initial abilities of both classes were relatively equal prior to the intervention. The experimental class achieved an average score of 41.84 in the pretest, while the control class achieved an average score of 41.00. This slight difference suggests that both groups had similar levels of initial knowledge.

Following the implementation of the guided inquiry learning model assisted by the SSI e-module integrated with Islamic values, there was an increase in scores in

both classes. However, the experimental class demonstrated a significantly superior overall performance, attaining an average post-test score of 80.22. Meanwhile, the control class achieved an average post-test score of 65.18. Following the implementation of the learning model, there was an increase in the mean scores of both classes. However, the experimental class demonstrated a significantly superior overall performance, attaining an average post-test score of 80.22. Meanwhile, the control class achieved an average post-test score of 65.18.

The efficacy of the treatment was most evidently demonstrated in the N-Gain data, which quantifies the magnitude of improvement. The experimental class obtained an N-Gain score of 67 (or 0.67), which falls into the moderate (towards high) improvement category. Conversely, the control class exhibited an N-Gain of 41 (or 0.41), which also falls within the moderate category. Despite their shared categorisation, the experimental class exhibits a substantially higher N-Gain value, indicative of the markedly superior efficacy of the learning model applied to this class.

The higher increase in the experimental class indicates that the learning model applied in the experimental class, namely the guided inquiry model assisted by the SSI e-module integrated with Islamic values, is more effective in improving students' scientific argumentation skills compared to the conventional learning model applied to the control class.

Significance in Students' Scientific Argumentation Skills

To examine the differences in scientific argumentation skills between the experimental and control classes after the treatment, a posttest data analysis was conducted. The results of the analysis are presented in the following table.

Table 2. Posttest Data of Experimental and Control Classes

Component	Experiment Class	Control Class
Average	80,22	65,18
Median	81,50	66,00
Minimum Value	66	45
Maximum Value	98	82

Based on Table 2, statistical calculations using SPSS software version 20 on the experimental class posttest show that the average score is 80.22; the middle value is 81.50; the minimum value is 66 and the maximum value is 98. While the posttest value in the control class shows that the average score is 65.18; the middle value is 66.00; the minimum value is 45 and the maximum value is 82.

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A normality test was conducted on the posttest scores to determine whether the data were normally distributed. The results of the normality test are presented in the following table:

Table 3. Posttest Normality Test of Experimental and Control Classes Table

Test of Normality				
	Class	Kolmogorov-Smirnov[a]		
		Statistic	df	Sig.
Final Skill Scientific Argumentation	Experiment	,086	32	,200
	Control	,106	33	,200

Based on Table 3, the results show that the significant value (sig) for the posttest data of the experimental and control classes. In the Kolmogorov-Smirnova test, the experimental class pretest value was 0.200> 0.05 and the control class was 0.200> 0.05, it can be concluded that the research data is normally distributed, which means Ha is rejected and H0 is accepted.

A homogeneity test was conducted on the posttest scores to determine whether the data from the experimental and control classes had equal variances. The results of the homogeneity test are presented in the following table:

Table 4. Posttest Homogeneity Test of Experimental and Control Classes

Test of Homogenity of Variances			
		Levene Statistic	Sig.
Final Skill Scientific Argumentation	Based on Mean	3.358	,072

Based on Table 4, the results of the Levene Statistic test show a significant value (sig) of 0.072> 0.05, it can be concluded that both data have homogeneous variance, which means Ha is rejected and H0 is accepted so that the data can proceed to the t test (Independent Sample Test).

An independent sample t-test was conducted to examine whether there was a significant difference in scientific argumentation skills between the experimental and control classes based on the posttest scores. The results of the hypothesis test are presented in the following table:

Table 5. Posttest Hypothesis Test of Experimental and Control Classes

		Levene's Test for Equality of Variances		t-test for Equality of Means						
		F	Sig.	T	Df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference	
									Lower	Upper
Final Skill Scientific Argumentation	Equal variances assumed	3.358	.072	6.325	63	.000	15.037	2.377	10.286	19.788
	Equal variances not assumed			6.352	59.692	.000	15.037	2.367	10.301	19.773

Based on Table 5, the results of hypothesis testing with the Independent Test technique on the posttest of the experimental and control classes, show the interpretation value of sig. (2-tailed) which is 0.000 <0.05 then Ho is rejected and Ha is accepted with the conclusion that there is a significant difference in the final scientific argumentation skills between the experimental and control classes. Because there is a significant difference, the formulation of the research problem can also be answered, namely the improvement of students' scientific argumentation skills with the application of the guided inquiry learning model assisted by the SSI e-module integrated with Islamic values on the material of the earth and solar system.

Improvement of Scientific Argumentation Skills for Each Indicator

Each indicator is measured to see the extent to which students can develop their scientific argumentation skills after the learning treatment. The indicators include claim, evidence and reasoning. Based on the results of the basic calculation analysis of the improvement of students' scientific argumentation skills for each indicator contained in appendix C3, it can be seen from the comparison diagram of the average gain score for each indicator of scientific argumentation skills, as follows:

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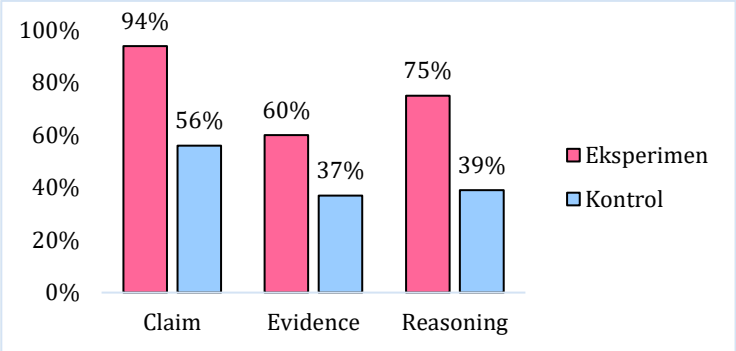

Figure 4. Comparison diagram of the average gain score for each indicator of scientific argumentation in experimental and control classes.

Based on the figure 4 diagram, it can be seen that the percentage of the average gain score on the scientific argumentation skills indicators of the experimental and control classes both increased. However, it can be seen that the increase in all aspects of scientific argumentation skills in the experimental class is better than the control class. In the experimental class, there were two aspects of scientific argumentation skills whose percentage of the average gain score fell into the high category, namely claiming by 94% and reasoning by 75%. While evidence is included in the medium category with an average gain score of 60%.

In the control class, the percentage of the average gain score of all aspects of scientific argumentation skills fell into the moderate category. If sorted starting from the highest, the claim aspect with a value of 56%, the reasoning aspect with a value of 39% and the evidence aspect with a value of 37%. Based on this data, it can be seen that in the experimental class, the claim and reasoning aspects have the highest percentage gain score and the evidence aspect has the lowest percentage gain score. In the control class, the claim aspect has the highest percentage gain score and the evidence and reasoning aspects have the lowest percentage gain score.

The test used consisted of five essay questions on scientific arguments related to the Earth and solar system. According to (Tanfiziyah & Rochintaniawati, 2021) Arguments are used to answer difficult and challenging questions. Argumentation skills are important for training students to think scientifically, communicate, and act like scientists. Argumentation skills are one of the communication skills that can improve conceptual understanding. Argumentation skills are a moderator for higher-order thinking skills (Kuki et al., 2023). As an integral part of science, argumentation skills should be included as one of the components in science education (Amielia et al., 2018).

According to Toulmin, indicators of students' scientific argumentation skills consist of six components: claim, evidence, warrant, backing, rebuttal, and qualifier (Y. Rahayu et al., 2020). The scientific argumentation test in this study only uses three indicators, namely claim, evidence, and reasoning. Therefore, students must understand scientific criteria for evaluating the quality of argumentation, structure, and interaction (Grooms et al., 2018).

The results of the pretest and posttest showed that the experimental class, which applied the guided inquiry learning model assisted by the SSI e-module integrated with Islamic values, showed a more significant improvement in scientific argumentation skills compared to the control class. According to (Aisyah & Wasis, 2015) this indicates that the application of a learning model based on a guided inquiry approach can improve students' ability to argue scientifically, as reflected in higher post-test scores.

The pretest answers did not align with the characteristics of scientific argumentation, suggesting a nascent understanding of these skills among students. In contrast, the posttest answers indicated that the majority of students successfully demonstrated scientific argumentation skills, as evidenced by their accurate responses to multiple questions. This is in line with the opinion that (Grooms et al., 2018) Developing arguments related to scientific concepts can help students engage in important scientific practices and improve their knowledge of science content.

Based on the students' answers, it can be seen that there is a difference between the pretest and posttest answers of the students. In the pretest answers, for each indicator of scientific argumentation, the students only answered as best they could. After examination, it was found that in general, the pretest answers given by the students were inaccurate and did not match the indicators of scientific argumentation, such as inaccurate claims and no explanation, no data presented, and no reasons given. According to (Triananda et al., 2025) The quality of the arguments developed by students shows their understanding of the concepts. Therefore, it can be concluded that scientific argumentation skills were not yet present in the students' pretest answers, but in the posttest answers, scientific argumentation skills were evident in each indicator.

This is because students have already been trained in scientific argumentation skills in previous teaching and learning activities using a guided inquiry learning model assisted by SSI e-modules integrated with Islamic values. This research is agreed upon by (Yulianing et al., 2023) that the factors influencing argumentation skills in learning are affected by the learning model used, the learning approach, the way teachers guide learning activities, as well as environmental and social factors. In addition, this study is also in line with (R. Rahayu et al., 2023) who says that one learning model that

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can improve conceptual understanding is guided inquiry using scientific argumentation activities.

In line with relevant research conducted by (Daryanti et al., 2015) entitled "Improving Scientific Reasoning Skills Through Guided Inquiry Learning Models in Human Respiratory System Material" found that students' scientific argumentation skills improved with guided inquiry learning models. In addition, research conducted by (Nawawi & Nurita, 2024) With the title "The Application of Guided Inquiry Learning Model to Improve Scientific Argumentation Skills of Junior High School Students on the Topic of Light," it can be said that there was an improvement in the argumentation skills of eighth-grade junior high school students after learning with the guided inquiry learning model. Students' argumentation skills were assessed based on three indicators, namely claim, data, and warrant/reasoning. The results showed a 30% increase in the claim indicator, a 50% increase in the data indicator, and a 60% increase in the warrant indicator. This indicates a significant improvement in students' argumentation skills.

As demonstrated in Figure 4, it is evident that both classes possess the capacity to formulate claims; however, their proficiency in substantiating these claims remains deficient. The utilisation of data and evidence constitutes the primary foundation of argumentation in the context of science learning, with the objective of providing support for the elucidation of scientific concepts (Bayram-Jacobs et al., 2019; Manz et al., 2020; Panadero, E., & Jonsson, 2020; Zhai et al., 2020; Zhu et al., 2020). It has been demonstrated by preceding studies that Argument-Driven Inquiry (ADI) textbooks are conducive to the development of argumentation skills among students. Furthermore, Argument Driven Inquiry (ADI) fosters critical and logical thinking by providing opportunities for the generation and utilisation of data, in addition to the formulation of responses to queries through the composition of written content, concepts, and scientific language (Grooms et al., 2014; Marhamah et al., 2017; Sampson & Walker, 2012). Consequently, future research should concentrate on enhancing the guided inquiry learning model assisted by e-module SSI integrated with Islamic values to more effectively assist students in arguing, particularly at the evidence stage.

4. Conclusion

Based on the research results, it can be concluded that the application of the Guided Inquiry learning model combined with the SSI e-module integrated with Islamic values significantly improves students' scientific argumentation skills in Earth and Solar System material. The independent sample t-test shows a significance level of 0.000 < 0.05, indicating a significant difference between the experimental and

control groups. This finding highlights the novel integration of socio-scientific issues with Islamic values in science learning, which not only enhances argumentation skills but also promotes value-based scientific thinking. The result confirms that the research objective was successfully achieved and provides a meaningful contribution to developing both cognitive and character aspects in science education.

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