The Effect of 4 Step Jigsaw and Jigsaw Learning Implementation on the Junior High School Students' Argumentation Skills in the Concept of Plants Structure and Function Viewed from the Level of Confidence

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Abstract: Argumentation skill is a part of the critical thinking ability needed by students to be successful in learning science. This study aims to understand the effect of the implementation of 4 Step Jigsaw (4SJ) and original jigsaw learning models in rehearsing the argumentation skill of junior high school students in the concept of plant structure and function. This argumentation skill is further investigated in the lens of varied students' level of confidence. This study employs the quasi-experiment factorial 2 x 2 with the type of Pretest Posttest Nonequivalent Control Group design. The population was the students from grade 8 SMPN 17 Batanghari with total of 106 students, consisted of 44 males and 62 females. Some 53 students were recruited to be the sample grouped into 2 classes, i.e., the class 8A as the class 4SJ and the class 8C as the original jigsaw class. Data were collected using a valid self-confidence questionnaire and a valid pretest and a posttest in argumentation. Data were analyzed using two-way Anova test and statistics descriptive techniques. The results show that the 4SJ students have higher average of argumentation skill score (77.77) than the jigsaw students (71.17). It was also factual that students with better self-confidence also have higher average of argumentation skill score (75.13) than those with lower self-confidence (73.81). The results of two-way Anova test emphasize that there is an effect of the utilization of the models on the students' argumentation skill. There is also an effect of the students' self-confidence on the students' argumentation skill. Even though it was very weak, it can be said that there is a potential for the learning models and the self-confidence to have an interaction in causing the growth of the students' argumentation skill. It can be concluded that appropriate learning models and suitable self-confidence may affect students' learning outcomes.

Keywords: Argumentation skill; Original jigsaw; Self-confidence; 4 step jigsaw

Introduction

Education has an important role to increase human quality in the future by conducting learning process to students. Learning process is an activity which involves teaching and learning administered by a teacher based on a valid curriculum. Management class, support friend peer, and plan education individual is strategy instructional main teacher (Mangila et al., 2022). Curriculum characteristic holistic where knowledge, skills and values (values) combined with need information in curriculum based competence (Erma et al., 2019).

This is expected to provide positive effect to students in reaching the goal of education. The goal of education is planned to escort students to own better behaviors, better moral and intellectual state (Dimyati, 2009). Intelligence emotional influential significant to behavior student in follow learning class (Widodo et al., 2023). This ability must owned by each individual for become successful learner (Mustofa et al., 2019).

Learning process implemented by teacher usually use less interested learning models so that make

students fed up. Interest study will arouse desire to know, so can increase skills process of student (Kamid et al., 2022). Common learning model implemented by teacher is like the STAD learning model, Group Investigation, Experiments, Discussions Information, etc. Those learning models are conventional cooperative learning models widely spread amongst teachers (Slavin, 1995). Learning model applied by researchers in this study is the 4 Step Jigsaw (4SJ). This model has not been implemented in the school where the first researcher is affiliated, that is Junior High School 17 Batanghari, Jambi. It is expected that students will gain better argumentation skills if this model is implemented in teaching science.

Besides the mentioned phenomenon, researchers have also done observations and the results showed that teachers experience difficulties in developing students' self-confidence in learning activity. Teacher doesn't give effect moderation to connection near between teachers and students (Nugraha et al., 2023). Highlight values education character and science education in the skills program emit opinions and create an interesting learning model (Suhada, 2019). Curriculum recommends that students to be active and be confident in posing ideas, opinions and arguments during learning process. It is widely impressed that learning in Indonesia is normally run in one direction and the level of students' self-confidence is low. This issue needs to be solved to create a better interactive learning process between teacher and students. For increase quality science learning then student should invited for activity solving problem (Mangila et al., 2022).

To increase the quality of learning science students should be invited to solve problems. In a solving problem activity, it is not a simple thinking skill that need to be rehearsed to students but a more complex one, and argumentation skills in one of those. Argumentation skill can grow students' scientific thinking ability and communication (Rahayu et al., 2018). So far, researchers observe that students have low skills to make arguments. Literacy is very important in life every day, especially in the digital age (Widyasari et al., 2022). When a teacher gives a question which requires a complex answer, students are not able to provide claim, data and warrants (Rahmadhani et al., 2020). A part from that, we also observed that some teachers have trained students to make argumentation but the results are not satisfied as only few students who are able to provide argumentation. Increasecompetence teacher in increase aspect innovative, reflection, and solving problem and take decision (Murdani et al., 2022). Connection between draft self and solution problem in adapt (Noviandari et al., 2019). Therefore, teachers need to continue rehearsing students in making argumentation (Kumala, 2017).

Argumentation skill can be trained in the material of science including biology. One material being taught in biology is plant structure, function and network (Zubaidah, 2018). In learning this concept, students are not only needed to memorize parts of plant structure and functions, but students need to analyze the structure and network of cells, organs and tissues, then hook the structure with the function (Rahmi, 2020). For capable of analyzing the structure and network of cells, organs and tissues then student need the ability to make a good argument. That student learn connection care environment to mark character and results study student on material existing context environment around (Ramli et al., 2022).

This study aims to understand the effect of the use of 4 Step Jigsaw (4SJ) learning model on the argumentation skills of junior high school students about plant structure and function. The results will be compared to the effect of the original jigsaw implemented by another class. Connection between attitude you have student and believe self to eye science lessons class (Ernawati et al., 2021). The effect of varied students' self-confidence will also be investigated as a moderator variabel in developing the students' argumentation skills. Learning with use that ability effective in increase independence, motivation, and results learning of science students (Endris et al., 2022). Furthermore, interaction between the models and the self-confidence will also be assessed. Enhancement skills scientific will make student more good in convey argumentation (Darmaji et al., 2022).

To guide the discussion, thus three hypotheses are posed:

H1: The use of the learning models affects the students' argumentation skills.

H2: The use of varied students' self-confidence affects the students' argumentation skills.

H3: Interaction between learning models and students' self-confidence is significantly presented.

Method

Research Design

This study is a quantitative study with a quasi-experimental design, and the type is Pretest Posttest Nonequivalent Control Group. This study involves 1 control group and 1 experiment group. Research design can be seen in Table 1.

This study involves two independent variables namely the 4SJ and jigsaw learning models, and a dependent variable i.e., argumentation skill. Besides that, this study also uses a moderator variable i.e., levels of self-confidence useful as a differentiating factor between the groups.

Table 1. Research Design

Group	Pre-test	Questionnaire	Treatment	Post-test
Experiment	T1	T2	X1	T3
Control	T1	T2	X2	T3

Description:
T1: Pre-test score
T2: Questionnaire Score
T3: Post-test scores
X 1: Use of 4SJ models and levels of self-confidence
X 2: Use of_ Jigsaw levels of self-confidence

Therefore, the design is also in a factorial of 2 x 2. The first factor is a learning model (4SJ and Jigsaw) and the second factor is the levels of self-confidence. The factorial design can be seen in Table 2.

Table 2. Research Design Factorial 2x2

Levels of self-confidence	Learning models	
	4SJ (M1)	Jigsaw (M2)
Height (P1)	P1M1	P1M2
Low (P2)	P2M1	P2M2

Population and Sample

The population is all the student of grade 8 in Junior High School (SMPN) 17 Batanghari in the first semester (July-September 2022/2023) totaling 106 students, divided into 44 males and 62 females. The sample was chosen using cluster sampling technique. The sample used totaling 53 students in 2 classes, i.e., class 8A as class experiment 4SJ and class 8C as original jigsaw control class.

The samples are distributed into two groups that is control group and experiment group. The experiment group was given 4 step jigsaw model (4SJ) and the control groups was given Jigsaw.

Instrument Research and Data

Data from students were collected using pretest and posttest. Data about self-confidence was collected using questionnaire and observation sheets as well as rubric rating scale.

Data Analysis Techniques

Obtained data was in the form of numbers. To test the hypotheses so the two-way analysis of variance (2 way Anova) was used with condition that data are normal and homogeneous (Uyanto, 2009). This test can measure whether there is an effect of the models on the argumentation skill, whether there is an effect of the self-confidence on the argumentation skill, and whether there is an interaction between the models and the self-confidence. The test was conducted using the SPSS 25. As for the reception criteria as follows:
- If p-value > 0.05 so Ho is accepted.
- If p-value < 0.05 so Ho is rejected.

Result and Discussion

The Effect of Learning Models on the Students' Argumentation Skill

Based on the result of 2-way Anova it is seen that the p-value is 0.015 (Table 3). This value is smaller than the alpha (0.05). This means that the Ho must be rejected. It means that there is an effect of learning models on argumentation skill of the junior high school students in the concept of plant structure and function.

Table 3. The Results of 2-Way Anova Test
Dependent Variable: JOIN

Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	5,193.907a	3	1,731.302	30.373	.000
Intercepts	227,523.549	1	227,523.549	3,991.482	.000
Learning Model	362.891	1	362.891	6.366	.015
Self-confidence	2,920.088	1	2,920.088	51.228	.000
Learning Model * Self-confidence	195.328	1	195.328	3.427	.070
Error	2,793.111	49	57.002		
Total	287,076.000	53			
Corrected Total	7987.019	52			

a. R Squared = .650 (Adjusted R Squared = .629)

The result is in line with the descriptive statistical test results (Table 4). It is seen that the 4SJ students has the average argumentation score higher (77.77) than the jigsaw students (71.77).

Herewith, it can be said that the learning outcomes of students who are learning using 4SJ is higher than the jigsaw students. This it can be stated that the learning outcomes of students who are taught with the 4SJ learning model are higher than students who are taught with the jigsaw learning model. This happens because the 4SJ learning model has advantages as stated by Sanjaya (2006), the 4SJ learning model has several advantages, namely: Each student complements one another, can provide opportunities for students to work together in other group teams, each student members have the right to become experts in their group, for the stages of student learning positive interdependence, can provide increased learning motivation, deeper understanding of the material, reduced apathy, higher acceptance of one's differences, greater student self-esteem, implement peer guidance, students who are less able to be assisted in solving problems, students feel what it is like to work in groups.

Table 4. Results of Argumentation Score

	4SJ (M1)	Jigsaws (M2)	Average
High self-confidence (P1)	77.87	72.39	75.13
Low self-confidence (P2)	77.67	69.96	73.81
Average	77.77	71.17	

4SJ learning model is a modified learning model from the jigsaw learning model. The 4SJ learning model is simplification from complex jigsaw syntax. 4SJ only includes 4 steps, that is, introduction, group focused, group share, and class discussion/review. 4SJ learning model is 4 Step Jigsaw, Syntax from previous jigsaw learning models experienced modification (Hasibuan et al., 2020). In internal learning 4SJ learning model class, students own more lots time for discuss with group student because syntax no too many. So that time discussion with group is more intensive. Based on Effendi-Hsb et al. (2019) in the jigsaw learning process student own that opportunity to manage information and repair communication Skills make all student will lots involved in activity discussion and own attitude impact positive on student to results learn it.

Results obtained show that the jigsaw learning model is sufficienteffective in increase ability argument students on the material structure and function plant. However there by more 4 SJ learning models effective for increase ability argument students on the material structure and function plant. This can happen because inside activity learning done through process two model learning this own that opportunity to manage information and repair communication skills, so all student will involve and will own positive impact to their results study. The results of this study are also supported by the results of Kartika et al. (2021) which states that there are differences in learning outcomes between student who learn with 4SJ and the jigsaw.

The Effect of Self-Confidence on the Students' Argumentation Skill

Based on the result of 2-way Anova it is seen that the p-value is 0.000 (Table 3). This value is smaller than the alpha (0.05). This means that the Ho must be rejected. It means that there is an effect of self-confidence on argumentation skill of the junior high school students in the concept of plant structure and function.

Trust self can push student for brave disclose opinion, dare show up, be brave ask, and so that can make student the superior or achievement compared to with colleagues those who are lacking believe themselves (Asiyah et al., 2019). Student which is lacking believe self tend close self, no brave put forward opinion, no brave or embarrassed ask, No brave to try/fear. Things the will resulted lack of motivation in study student. Trust self is need for every individual. If student own trust self, then they will ready to face dynamics from life inside school and environment which full with challenges (Gusdiana, 2020). Own belief in ability and not hide weakness self alone can deliver student become a successful and independent adult. Dictionary define "self alone trust self as believe self in own ability for do something an successful" (Sugianto et al., 2023).

This result is also confirmed by the data in table 4. It is clear that the students with higher self-confidence own the average argument score higher (75.13) than those with lower self-confidence (73.81). These findings are in line with the results of Febriyandari (2022) which stated that there is an effect of self-confidence on students' learning outcomes. The results of Gusdiana (2020) also stated that the application of the jigsaw learning model can increase self-confidence.

The Interaction Between the Learning Model and Self-Confidence

Based on the result of 2-way Anova it is seen that the p-value is 0.070 (Table 3). This value is higher than the alpha (0.05). This means that the Ho must be accepted. It means that there no interaction between the models and the self-confidence of the junior high school students in the concept of plant structure and function.

However, Figure 1 indicates that there is a potential for the two variables to be interacted in the future as the lines had different slopes. It is also considerable that the p-value 0.070 is only slightly higher than 0.05 supporting that the potential for the models and the self-confidence to be interacted in the future is possible.
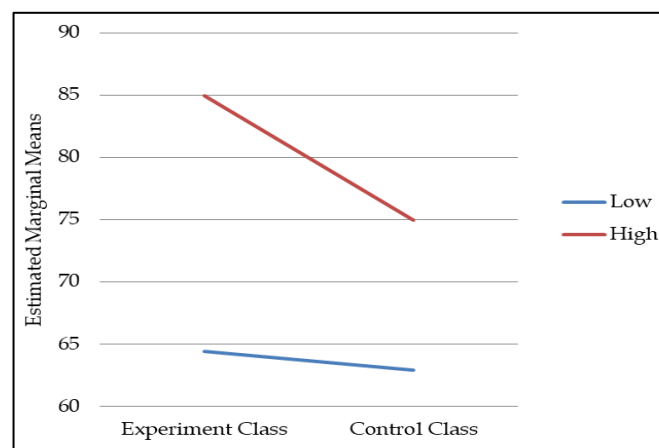
Figure 1. Curve of interaction

Research results this confirmed by research Agustiningsih et al. (2021) at a high school in Jambi City, stated that level ability argument student still enough low. Many students are still not able to argue well. One of them is lack of believe self or courage student in put forward his opinion and that student only can put forward opinion but not yet capable convey reasons and evidence for support opinion or statement the. In line with results research by Devi et al. (2018) has researching

about Skills argument students at a high school in Surakarta on material solution buffer. Research results show that categorization student skills argument is at level 1 and level 2. This shows that student argument skills still in level low-medium (only displays claim or claim with data).

Based on research at SMA Negeri (Senior High School) 11 Jambi City in general student own weakness in argued because student no believe self or not yet get used to, this because the teacher hasn't practice student for argue. Argument in learning must get attention special from the teacher. During these teachers tend test ability student to answer given, has meaning understand, understand that concept simple, provide brief explanation, give conclude which is not deep (Witri et al., 2020).

Delivery material lessons by members group expert to group origin not enough effective (still awkward), time limited , atmosphere class easy noisy with formation group, and the passive students only depend on other student, because that information obtained by student in finish material not yet complete (Karta et al., 2021). Inside study from Hasibuan et al. (2020) research on the jigsaw learning model that has been implemented in several developing countries country has constraint in influence success implementation group learn. One obstacle in implementation is lack of time learning.

There is an interaction between self-confidence and learning models on students' learning outcomes. Through a cooperative learning can increase self-confidence of students (Pranoto, 2016).

Conclusion

Based on the results of analysis it can be concluded that there is an effect of the use of 4 Step Jigsaw (4SJ) on argumentation skill of the junior high school students in the concept of plant structure and function. This is factual from the difference of mean score of the 4SJ class and the jigsaw class. Based on the results of analysis it can be concluded that there is an effect of self-confidence on argumentation skill of the junior high school students in the concept of plant structure and function. This is factual from the difference of mean score of the high confident students to the low confident students. There is no interaction between the models and the self-confidence of the junior high school students in the concept of plant structure and function. However, a chance to be interacted between the models and the self-confidence is widely open as the lines have different slopes.

Acknowledgements

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