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The Influence of the Picture and Picture Model with the JAS Approach on Cognitive Learning Outcomes and Student Creativity at SMA Negeri 1 Jakenan

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Abstract

The The demands of 21st century learning and the Independent Curriculum have not been fully implemented well, especially the creative abilities of students at SMA N 1 Jakenan. Based on observations made at SMA Negeri 1 Jakenan, it was found that students were less active during learning so that students' creativity was less developed. Students also still need additional learning resources apart from using LKPD and textbooks. This research aims to analyze the influence of the Picture and Picture model with the JAS approach (PICJAS) on students' cognitive and creative learning outcomes in Plantae material. This research is a type of quasi-experimental research with a Pretest-Posttest Nonequavalent Control Group Design. The samples used in this research were X3 (experimental class) and X4 (control class) which were taken using purposive sampling technique. The data collection technique in this research is using tests, product assessment, observation and giving questionnaires. Data analysis was carried out using the independent sample t-test for student cognitive learning outcomes and the Mann Whitney test for student creativity outcomes. Based on data analysis using the independent sample t-test and the Mann Whitney test, a significance value of 0.00 and 0.00 was obtained, because the sig value < α (0.05) means that there is a significant difference between the classes given the model treatment. PICJAS with classes treated with the lecture and discussion method or H0 is rejected and H1 is accepted. These results show that there is a significant influence from implementing the PICJAS learning model on improving students' cognitive learning outcomes and creativity. This influence can make the PICJAS model an alternative learning model that can improve students' cognitive learning outcomes and creativity.

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INTRODUCTION

The 21st century learning era emphasizes students to have 4C skills. This is in accordance with the characteristics of 21st century society skills published by the Partnership of 21st Century Skills which states that students in the 21st century are focused on developing *critical thinking skills* (Critical Thinking), *problem solving* (Problem Solving), *communication skills* (Communication skills), *information and communication technology literacy* (Information and Communication Technology), information literacy and media literacy (Prihadi, 2018).

The demands of 21st century learning and the Independent Curriculum have not been fully implemented well, especially the creative abilities of students at SMA N 1 Jakenan. Based on observations made at SMA Negeri 1 Jakenan, it was found that students did not participate enough during learning. Students are more silent and just listen to the teacher's explanation. This makes students tend to be more passive and less active. Students' lack of activity causes students' creativity to be less developed. This is in line with research from Larasati & Dwidayati (2021) which states that groups of students with low/medium activity have lower creative thinking abilities compared to groups with high activity. Students at Jakenan 1 Public High School also still need additional learning resources apart from using Student Worksheets (LKPD) and textbooks. Based on information, students at SMA Negeri 1 Jakenan stated that there was still a need for additional learning resources to expand their knowledge. The scope of the Plantae material includes broad material including the moss plant group or Bryophyta, the fern group or Pterydophyta and the seed plant group or Spermatophyta so that additional learning resources are needed to meet the expected learning outcomes (CP). The result of these problems is that students are less than optimal in understanding the contents of the Plantae material as evidenced by the average daily test results for some students who are still below the KKTP (below 66). In this material, students are expected to be more active during learning so that students are able to develop their creativity.

Due to these various problems, it is necessary to innovate learning models that can encourage students to interact directly with nature and make it easier for students to understand the material and develop their creativity. The innovative learning model is the PICJAS learning model, which comes from a combination of the words Picture and Picture and Exploring the Natural Environment (JAS). This model combines the Picture and Picture learning model with the JAS approach.

The use of the Exploring the Natural Environment (JAS) approach in the PICJAS model aims to enable students to learn directly by utilizing nature/the environment contextually. According to Samitra et al. (2016) stated that the JAS approach requires students to develop the knowledge and information they obtain based on Biology concepts which can be done through investigative activities and exploration activities of the natural surroundings. The JAS approach can also foster a spirit of independence and a sense of responsibility, especially in learning Biology. Yuniastuti (2013) stated that in Biology learning there needs to be an orientation towards the environment. Biology learning is not effective if it is only applied in classroom learning without having to go out to see the surrounding environment as a learning resource. Environmentally oriented learning can encourage and change students' thinking that Biology lessons do not involve memorization but must develop thinking processes. Therefore, the JAS approach can be an alternative strategy in learning Biology.

The PICJAS learning model innovation combines the Picture and Picture model with the JAS approach. The use of the Picture and Picture model aims to enable students to develop their creativity through picture games. This is in line with the opinion of Rahmi & Yuswanti (2021) which states that the Picture and Picture learning model can increase students' learning motivation and activeness. Picture and picture learning can make students more active because in this learning students work together in groups. Prihatiningsih & Setyanigtyas (2018) stated that during the learning process students work in groups so that students become more active and creative. Learning using this model can improve students' cognitive learning outcomes and creativity. Khotimah's research (2019) shows that implementing the Picture and Picture learning model can improve student learning outcomes. Praseptia & Zulherman's (2021) research shows that classes that apply Picture and Picture are superior when compared to classes that use the lecture method. Based on this, research was conducted on The Influence of the Picture and Picture Model

with the JAS Approach on Student Cognitive Learning Outcomes and Creativity at SMA Negeri 1 Jakenan.

METHOD

This research was carried out at SMA Negeri 1 Jakenan in the 2022/2023 academic year. This type of research is quantitative research with a quasi-experimental method (Quasi Experiment) with a Pretest-Posttest Nonequavalent Control Group Design. The samples used in this research were X3 (experimental class) and X4 (control class) which were taken using purposive sampling techniques. The data collection technique in this research is using tests, product assessment, observation and giving questionnaires. Data analysis was carried out using the independent sample t-test for student cognitive learning outcomes and the Mann Whitney test for student creativity outcomes.

RESULTS AND DISCUSSION

The results of this research consist of data on cognitive learning outcomes and student creativity results.

Cognitive Learning Outcomes

Cognitive learning outcomes are learning outcomes related to intellectuals which include six aspects, namely remembering, understanding, analyzing, applying, evaluating and creating (Arifin, 2018). Data analysis of students' cognitive learning outcomes came from the pretest and posttest scores of both classes (Classes X3 and X4). The following data on the pretest and posttest results of control and experimental class students are presented in Table 1.

Table 1 Data on Cognitive Learning Results for Control Class (Lecture and Discussion Model) and Experiment Class (PICJAS Model)

Statistics	*Pretest*		*Posttest*	
	Control Class (Lecture and Discussion Model)	**Experimental Class (PICJAS Model)**	**Control Class (Lecture and Discussion Model)**	**Experimental Class (PICJAS Model)**
Lowest Value	40	40	55	70
Highest Value	65	70	90	95
Average	51.25	55.97	71.81	81.53
Standard Deviation	7.11	7.82	8.03	6.85

Based on Table 1, it shows that the average pretest score for experimental class students is higher than that of the control class. The lowest score on the pretest for control and experimental class students had the same value, namely 40. The posttest results for experimental class students had a higher average than the control class.

Students' cognitive learning outcomes have six aspects, including C1-C6. However, in this study the questions used only consisted of C1-C5. The following data on the number of experimental class and control class students who answered questions correctly on each cognitive aspect are presented in Table 2.

Table 2 Number of Experimental and Control Class Students Who Answered Correctly on Each Cognitive Aspect

No.	Cognitive Aspect	Number of Questions	Number of Students in Experiment Class		Number of Students in Control Class	
			Pretest	*Posttest*	*Pretest*	*Posttest*
1.	C1	3	35	34	36	31
		10	29	35	19	28
		16	30	34	27	32

No.	Cognitive Aspect	Number of Questions	Number of Students in Experiment Class		Number of Students in Control Class	
			Pretest	*Posttest*	*Pretest*	*Posttest*
2.	C2	1	27	32	33	32
		7	20	30	32	33
3.	C3	6	29	29	9	25
		9	10	30	18	32
		12	34	32	25	32
		14	25	32	21	33
		19	21	28	14	20
4.	C4	2	14	24	7	15
		4	10	29	10	14
		5	8	26	22	24
		8	10	26	7	20
		17	24	30	24	29
		11	14	25	8	23
		13	28	35	17	31
		15	5	21	4	13
		20	23	31	18	27
5.	C5	18	7	24	18	22

Based on Table 2, it shows that the majority of experimental class students were able to answer more questions correctly than the control class.

The N-Gain test aims to determine the difference between the pretest and posttest results. Based on the results of data analysis, the N-Gain test results are presented in Table 3.

Table 3 N-Gain Test of Cognitive Learning Results for Control Class (Lecture and Discussion Model) and Experiment Class (PICJAS Model)

Research Data	Class	N-Gain Test Results	Category
Student Cognitive Learning Results	Experimental	0.57	Medium
	Control	0.41	Medium

In Table 3, it can be seen that the N-Gain test results for the control class and experimental class on student cognitive learning outcomes data are in the range $0.30<Gain\leq0.70$, so the increase between the pretest and posttest is categorized as moderate. The N Gain value results in both classes are in the same medium category. This is because based on observations during the learning process, control class students tend to be quieter and pay more attention to the teacher's explanations, whereas in the experimental class the class conditions are quite different, namely they tend to be busier and pay less attention to the explanation of the material presented by the teacher. So this is what causes the N Gain value of the cognitive learning outcomes of control and experimental class students to be almost the same.

Hypothesis testing is intended to answer the hypothesis that has been proposed. Hypothesis testing of student cognitive learning outcomes test data was analyzed using the independent sample t-test in the SPSS statistical program and tested on all data in general and on each cognitive aspect. However, the cognitive aspects tested were only C1 to C5. This is because the question only consists of C1-C5. Based on the results of the analysis carried out using SPSS, the sig value was obtained. on each cognitive aspect presented in Table 4.

Table 4 Independent Sample T-Test on Each Student's Cognitive Aspect

No.	Cognitive Aspects	T-Test Results	Category
1.	C1	0.03	Significant
2.	C2	0.03	Significant

No.	Cognitive Aspects	T-Test Results	Category
3.	C3	0.52	Not Significant
4.	C4	0.04	Significant
5.	C5	0.44	Not Significant

Based on Table 4, it shows that there are three cognitive aspects that have a significant impact on student learning outcomes, including aspects C1, C2 and C4. Aspects that do not have a significant impact are aspects C3 and C5. This shows that the PICJAS learning model treatment given has an effect on students' cognitive learning outcomes. The most influential ones are the cognitive aspects C1, C2 and C4. The results of data analysis on students' overall cognitive learning outcomes are presented in Table 5.

Table 5 Independent Sample T-test on Overall Student

T-test Results	α	Category
0.00	0.05	Significant (because the data results are significant < α (α = 0.05)).

Table 5 shows that the results of data analysis using the Independent Sample T-test obtained a significance value of 0.00 because the data results were significant < α (α = 0.05), so there was a difference between the two treatments given or H_0 was rejected and H_1 was accepted, meaning that the cognitive learning results of the experimental class which used the PICJAS learning model were better than the learning results of the control class.

Based on the results of observations, the Picture and Picture learning model with the JAS approach (PICJAS) has a positive influence on students. Students who initially did not participate enough during learning, now with this innovative learning model, students have become more active. Students become more dominant when learning takes place. Student activity begins to emerge during the second step of the PICJAS model, namely delivering the material. When the teacher gave an apperception in the form of a trigger question, all the students looked enthusiastic to answer the question. Student activity also appears during the next steps until the final step, namely in the form of competency presentation and closing.

With the PICJAS model, students will better understand the concept of plant grouping directly in addition to the theory from the book. This can be seen during the exploration step in the PICJAS model where students are invited to explore outside the classroom to observe the characteristics of the plants found and classify them. According to Awaluddin & Setiyadi (2023), learning outside the classroom helps students interact and observe objects being studied directly from nature so that they can develop students' learning motivation and creativity in the learning process. Students can also experience learning while playing, so students will not feel bored during learning and will be more motivated to learn. This is because the PICJAS model has a bioedutainment component which can make students more active, enthusiastic, happy and challenged (Choirunnisa & Irsadi, 2014).

The Picture and Picture model with the JAS approach (PICJAS) can hone students' cognitive abilities through the steps contained in it. This is in accordance with research by Khotimah (2019) showing that implementing the Picture and Picture learning model can improve student learning outcomes. Praseptia & Zulherman's (2021) research also shows that classes that apply Picture and Picture are superior when compared to classes that use the lecture method. Using the JAS approach also has an influence on student learning outcomes. This is in accordance with previous research conducted by Putra (2021) where the use of the Exploring the Natural Environment (JAS) approach model had a significant influence on students' cognitive learning outcomes. This is in accordance with research by Rahmi & Yuswanti (2021) which states that the Picture and Picture learning model can increase students' learning motivation and activeness. Students whose learning motivation increases can foster enthusiasm for learning so that the value of their learning outcomes also increases.

The Picture and Picture learning model with the JAS (PICJAS) approach uses puzzles as the medium. The use of this puzzle has a significant influence on students' cognitive learning outcomes. This is in line with previous research which states that the use of puzzle media has a significant influence on student learning outcomes (Hastuti, 2017). Nurpratiwiningsih & Mumpuni (2019) explained that the existence of this puzzle media has a good influence on students' cognitive learning outcomes. The advantages of using puzzle media are that it can improve cognitive skills, motor skills, train hand and eye coordination, train logic, patience and interaction between students in learning. Using this puzzle also gives students a sense of enjoyment because they can experience new variations in learning (Aisha *et al.,* 2019).

According to Bloom's Taxonomy, cognitive learning outcomes consist of six levels, namely remembering, understanding, analyzing, applying, evaluating and creating. This remembering and understanding stage occurs in the material presentation step in the PICJAS model. In this step the teacher provides apperception in the form of trigger questions to students regarding the Plantae material. Having trigger questions can make students remember Plantae material from middle school. This is in line with the opinion of Pandu, Purnamasari & Nuvitalia (2023) who state that trigger questions can develop students' memory and thinking skills and can develop students' courage in expressing opinions. The understanding stage occurs when the teacher delivers material about Plantae. At this stage students listen to explanations from the teacher and understand the material or concepts presented.

The analyzing and implementing stage occurs in the exploration/exploration step. At this stage students analyze and apply the concepts they have learned previously, namely regarding classification of Plantae material by exploring in the school garden. Students observe the characteristics of plants found in accordance with the classification concept that was previously studied when the teacher presented the Plantae material. The observation data is analyzed and recorded on the LKPD provided. The evaluation stage occurs at the competency delivery and closing steps in the PICJAS model. At this stage the teacher explains further or emphasizes the material being taught in accordance with the competencies to be achieved and the teacher also gives posttest questions to students. The creation stage appears during the steps of creating and assembling the plant puzzle in the PICJAS model. In this step, students in groups create puzzles according to their respective ideas and arrange puzzles from other groups. The use of puzzles in the PICJAS model can improve students' cognitive learning outcomes. This is in line with the opinion of Sari (2018) who states that puzzle learning media can stimulate children's cognitive development. Therefore, the PICJAS learning model has a significant effect on improving student cognitive learning outcomes.

Creativity

Creativity is a person's ability to create or produce something new or original, which was previously unknown and can be used to solve the problems faced (Oktaviani, 2014). According to Greenstein (2012), creativity has four indicators, including Fluency, Flexibility, Originality and Elaboration. The instrument for measuring student creativity is carried out using a student creativity assessment sheet. The results of calculating creativity scores for control class and experimental class students are presented in Table 6.

Table 6 Results of Student Creativity Assessment in Control Class (Lecture and Discussion Model) and Experiment Class (PICJAS Model)

No.	Class	Treatment	Average of each Creativity Indicator				Final Results (%)	Category
			K1	K2	K3	K4		
1.	Control Class (Lecture and Discussion Model)	*Pretest*	2.44	2.41	2.92	2.06	61.46	Quite Creative
		Posttest	3.19	2.86	3.33	2.11	71.88	Creative
2.	Experiment Class (PICJAS Model)	*Pretest*	3.14	2.86	3.72	2.61	77.08	Creative
		Posttest	3.50	3.50	4.00	3.33	89.58	Very Creative

Information :
K1= *Fluency*
K2= *Flexibility*
K3= *Originality*
K4= *Elaboration*

Based on Table 6, it shows that the score for the highest creativity indicator is in the authenticity indicator. This is because each student creates a puzzle with their own creative (original) ideas without copying from other groups. Everyone is unique and has different thoughts, so no puzzle result is exactly the same. This is in accordance with the opinion of Aisyah (2015) who states that each person has their own uniqueness, both in terms of character, nature and intelligence. Each individual definitely has differences between one another so that no individual is exactly the same. These differences are God's gift given to each person with their own uniqueness and characteristics. The lowest score is in the elaboration aspect. This is because based on the results of the assessment of puzzle products, some groups still have difficulty completing puzzle elements such as scientific names, classifications and observed characteristics. Students still have difficulty finding the characteristics of the plants they get. The majority of students only fill in two to three characteristics. Apart from that, there were several groups who did not add additional elements to the puzzle because they felt confused about finding information and had difficulty observing the characteristics of the plants. A comparison graph of the average percentage of creativity levels of experimental class and control class students can be seen in Figure 1.

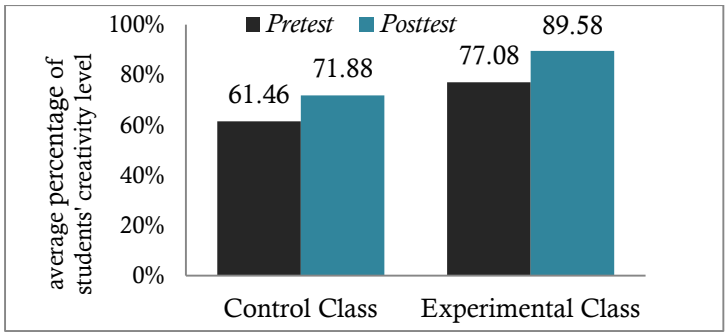

Figure 1 Comparison graph of the average percentage of creativity levels of students in the experimental class and control class

Based on Figure 1, it shows that there was an increase in students' creativity results after the treatment, both in the experimental class and the control class. The highest increase was in the experimental class, namely 12.5%.

The N-Gain test aims to find differences between the pretest and posttest results of student creativity results. Based on the results of data analysis, the N-Gain test results were presented in Table 7.

Table 7 N-Gain Test of Creativity in Control Class (Lecture and Discussion Model) and Experiment Class (PICJAS Model)

Research Data	Class	N-Gain Test Results	Category
Creativity	Experiment	0.64	Medium
	Control	0.29	Low

In Table 7 it can be seen that the results of the N-Gain test for the student creativity experimental class show an N-Gain value which is in the range 0.30<Gain≤0.70, so it can be interpreted that the increase between the pretest and posttest is categorized as moderate, whereas for the control class has an N-Gain value in the range of 0.00<G value≤0.30 which is categorized as low.

Hypothesis testing of student creativity data was analyzed using the Mann Whitney test in the SPSS statistical program. This is because there is some data that is not normally distributed so hypothesis testing is carried out using the Mann Whitney test. The results of the analysis of student creativity data are presented in Table 8.

Table 8 Mann Whitney Test on Student Creativity Results Data

Mann Whitney Test Results	α	Kategori
0.00	0.05	Significant (because the data results are significant < α (α = 0.05))

Based on Table 8, it shows that the results of the analysis carried out using SPSS obtained a sig. is 0.00 because the results of the data are significant <α (α = 0.05), then there is a difference between the two treatments given or H_0 is rejected and H_1 is accepted, meaning that the results of the creativity of experimental class students who use the PICJAS learning model are better than the results of class creativity control.

The application of the Picture and Picture learning model with the JAS (PICJAS) approach really helps students develop their creativity. Based on the observations that have been made, it was discovered that during normal learning which uses lecture and discussion methods, students do not participate enough during learning. Students just sat quietly and were less active in asking questions during the discussion session. Students' lack of activity makes students' creativity less developed. This is in accordance with research from Larasati & Dwidayati (2021) which states that groups of students with high activity have higher creative thinking abilities compared to groups with low/medium activity. However, with the innovation of the PICJAS learning model, students become more active and can develop their creativity

The Picture and Picture learning model with the JAS approach (PICJAS) is an innovative learning model that combines the Picture and Picture learning model with the JAS approach. The Picture and Picture model is a learning model that uses pictures as the medium, while the JAS approach is an approach that uses nature as a learning resource. The media used in this research is a plant puzzle made by each group. Making this puzzle will stimulate the creativity of each student. This is because when making a puzzle students will bring out all their ideas and creativity so that an interesting puzzle is produced. Apart from making puzzles, students' creativity is also honed when preparing puzzles. Putting together a puzzle requires skill and creativity in putting each piece of the puzzle together so that the resulting puzzle is complete and matches the original image. The JAS approach emerges when students explore to find plants that match the picture they get and observe what characteristics are found in these plants.

The process of making and compiling puzzles encourages creativity in students. This is in line with research by Pratiwi & Aslam (2021) which states that the application of the Picture and Picture model has been proven to stimulate students' courage, activeness and creative thinking abilities. The Picture and Picture model can train students' creativity through systematically arranged picture games. According to Rahmi & Yuswanti (2021), the Picture and Picture learning model can increase students' learning motivation and activeness. Picture and Picture learning can make students more active because in this learning students will work together in groups. The more active students can also encourage student creativity. In accordance with the opinion of Prihatiningsih & Setyanigtyas (2018) which states that during the learning process students work in groups so that students become more active and creative, so that they can improve students' cognitive learning outcomes and creativity.

The innovative Picture and Picture learning model with the JAS approach (PICJAS) uses the JAS approach in implementing its learning. The aim of using the JAS approach is to increase students' ability to explore in nature (physical) so that their creativity develops. This is in accordance with previous research by Sitorus *et al.* (2022) who stated that Exploring the Natural Environment (JAS) has a positive influence on student creativity. According to Roslianti *et al.* (2015) stated that the JAS approach invites students to explore natural resources and everything that happens in the environment, both the social

environment, society and the natural surroundings, so that students' creativity and potential become more developed. Based on several studies, it can be said that the Picture and Picture learning model with the JAS (PICJAS) approach has an effect on student creativity.

CONCLUSION

Based on the results of the research and data analysis that has been carried out, it can be concluded that:

1. The Picture and Picture learning model with the JAS approach (PICJAS) has a significant effect on improving students' cognitive learning outcomes in Plantae material at SMA Negeri 1 Jakenan.
2. The Picture and Picture learning model with the JAS approach (PICJAS) has a significant effect on increasing student creativity in Plantae material at SMA Negeri 1 Jakenan.

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