

## Investigation of Biology Students' Cognitive Structure Ability Regarding the Central Dogma of Molecular Biology

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**Abstract:** The purpose of this study was to improve biology learning outcomes in genetic material for class XII-MIPA 8 students of SMAN 1 Tasikmalaya in the 2022/2023 academic year. The model is the media image. The subjects of this classroom action research were class XII.MIPA 8 students of SMAN 1 Tasikmalaya. The number of students is 35 people, 14 boys and 21 girls. This classroom behavior study was conducted in the 2022-2023 school year. This classroom action research was conducted for three months in odd semesters starting from October to December 2022. The research methodology for this classroom action research was carried out in two cycles, each cycle consisting of two meetings. Each cycle consists of planning, implementing, observing and reflecting. The research process consisted of Preliminary Research, Cycle 1 Planning, Cycle 1 Action Implementation, Cycle 1 Observation, Cycle 1 Reflection, Cycle 2 Planning, Cycle 2 Action Implementation, Cycle 2 Observation, and Cycle 2 Consists of reflection. The data collection technique is to collect test scores using tests (written tests) given at the end of each lesson in each cycle. Observational data is made by observing student activities during the learning process. Data analysis was performed using percentage statistics. The results showed that the students' learning outcomes increased from 40 before learning to 70 in cycle 1 and 85 in cycle 2. Student learning activities increased from the category of 'Enough' to 'Good' and from 'Good' to 'Very Good' . The application of media images can increase the activity and learning outcomes of biology in the genetic material for class XII. MIPA 8 SMAN 1 Tasikmalaya Academic Year 2022/2023.

**Keywords:** Learning outcomes, activities, media images, genetics

## INTRODUCTION

Education is inseparable from the learning process in schools, and the involvement of teachers and students is an important part of the learning process. The ability to organize good teaching and learning processes creates the conditions in which children can learn and is therefore the starting point for educational success. In addition to mastering the material, the teacher must also have the ability to convey the material being taught. The way the teacher creates a very comfortable atmosphere in the classroom has a big impact on how students respond to learning activities. Slameto (1991) states that the teacher's task is to "educate children by emphasizing give direction and motivation, give facility reach objective through adequate learning experiences and foster developments aspect such as values, attitudes and adjustments self.

Choose and use media in process study teach can done by teacher on moment teach material to student. Election and use media which appropriate expected can support process study teach in a manner adequate and effective. Teacher use media education which appropriate for make it easy student understand knowledge which be delivered by teacher In matter this writer as teacher biology class XII. Mipa 8 Senior High School 1 tasikmalaya want to use media picture in process learning biology on the material genetics. During this process learning which done teacher still characteristic conventional. Use method traditional in process learning no lots help student understand material genetics they. Matter this make activity study student become not enough active. Inactivity student in process learning cause low results study student. Teacher considered more active from student during process learning because in process learning traditional, student no own spirit for ask to teacher about material which no they understanding.

Media is vehicle which good for clarify or manifest lesson. Media which used teacher in process study teach for help student understand something eye lesson. Function media is tool for reach objective which wanted. Matter this apply for teacher which use media education for increase power remember (ability) his students. Media visual is wrong one media which can overcome limitations spatial and temporal. No all object can brought to class because images this can handle it. With use media picture in process learning, student experience enhancement activity study. This because the students interested with picture which shown by teacher to them. Increasing liveliness student in process learning also increase results study student.

Use picture as media learning for student. Media this stimulate study student and increase understanding and mastery they to field the, because example question can showed through picture for made studies case for student. Knowledge in where they is at can speed up study. Election and use media in process study teach can done by teacher on moment teach material to student. Media picture is media visual which only can seen and no contain element audio or voice. According arief (2003:21) media picture is a picture which related reluctantly material lesson which useful for deliver messages from teacher.

The reason behind problem in on, researcher interested for conduct

research class act with title "enhancement activity and results study biology on material genetics with the use of media images in class XII.Mipa 8 SMAN 1 Tasikmalaya 2022-2023 academic year

DNA is block building gene. Gen found in chromosome, chromosome found in core cell, and core cell found in cell which form body. Cells in whole body man contain chromosome from second person his parents. It means, a individual accept dna as material genetics only from one person old. For this, test dna done. Children accept material genetics from person old, so that dna child suitable with dna second person his parents. Wrong one technology which currently boom moment this is test dna for ensure identity person which related with connection family, especially father and mother. Test this usually used for identify dead body in case criminal certain, for find person old biological from children in a family, or for identify victim war which no is known. Why use test DNA. DNA (dioxynucleic acid) is substance which bring information genetics from generation to generation. Dna own a number of characteristic:

- (1) In the form macromolecules sour nucleate
- (2) Characteristic eternal because can replicate (double) so that can reproduced and inherited to his descendants
- (3) Can print codes genetics for furthermore translated becomesour amino constituents of protein.
- (4) Own pattern order nucleotides which different on every person,except twin identical

Illustration pictorial is tool education which in a manner effective can awaken interest study student is technique media learning. Media is channel communication or media which used forcarrying or conveying a message, where this medium is the road or tool for traffic something message between communicator with communication amiruddin, (1996). According to Mukhtar (2003) learning media in general can be interpreted as facilities and infrastructure that are used to helpachievement objective learning, whereas in a manner special media education is form tool method, or technique which used in framework more streamline the communication and interaction between teachers and students in the process learning at school. Media visual as wrong one picture which can convey message and help overcome difference learning, in nature matter this, media visual role in support success learning.

Use media education which in a manner appropriate and varied can overcome the passive nature of children educate. In this case educational media is useful for raises excitement in study, possible exists interaction whichgoing on between child educate with environment and in fact, as well as possible child educate study alone according to ability and interest(sukmadi, 1984). As a good medium, images must fulfill condition- terms that are understandable, simple and straightforward, not complicated or convoluted and replaced at certain times so that it remains new and also does not lose it attractiveness (sadiman, 1984).

### 2.3.2. Position media picture in learning

Position media picture in activity study teach is as following:

- 1) As tool help in use method teaching

In implementation process study teach, a teacher must using a variety of methods, such as lecture methods, methods question and answer and demonstration method. The use of such media is not can take place effectively without any help, for example media images or painting medium.

- 2) As source material lesson

The teaching and learning process cannot be carried out properly if not there is material which taught. So in matter this before teach should more formerly choose and material lesson from the source.

- 3) As tool explain material .

Media teaching function for clarify something material lesson.

- 4) As tool generator interest or attention

In the process of teaching and learning must be based on interest and attention because learning with full interest and attention will make it easier and speed up understanding of objects which studied.

According to (Sukmadi, 1984) use media education which in a manner appropriate and varied can overcome the passive nature of children educate. In this case educational media is useful for raises excitement in study, possible exists interaction whichgoing on between child educate with environment and in fact, as well as possible child educate study alone according to ability and interest. As a good medium, images must fulfill condition- terms that are understandable, simple and straightforward, not complicated or convoluted and replaced at certain times so that it remains new and also does not lose it attractiveness (Sadiman, 1984). Media picture often there is in books lesson and material other lessons. Arsyad azhar stated that "there are several kinds picture among them picture classification which on generally used for describe or classify objects, tourism or species". One of type picture grouping is picture which show types picture which group animal based on taxonomy animal andplant according to characteristic features naturally. Line (channel) time describe chronological relationship between the events that occurred. Pictures like this often used to show the temporal relation of historical events or the connection of famous people to the event. Pictures or paintings usually accompanies that important event. Timeline is very useful forincrease order time from series incident (Arsyad, 1997). The use of media images has advantages and disadvantages.

Media advantages picture is:

1. Picture something object which its nature concrete. Picture or photo show tree problem compared to the media herbal only
2. Image media can overcome limitation space and time, no all object or object can brought to class, for this picture can get over it.
3. Media can observe observation us.

4. Can used for clarify something problem
5. Cheap cheap and easy drawn alone

Weakness media picture are:

1. Picture only push perception sense eye
2. Image in the form of those things too complex not enough effective For activity learning .
3. The size very limited For group big .

Media picture is something media Which very needed in physics lessons so that it is expected to increase understanding and support student learning achievement toward a better. In general media picture in learning function as tool help visual(parable) in activity Study teach, which form something means Which can give experience direct to student thereby encouraging motivation to learn, making it easier to explain abstract concepts, media images can also enhance absorption or learning retention and to be able to avoid verbalism (Sadiman, 1984).

Step - step application image media in learning

1. Participant educate shared in a number of group
2. Teacher prepare image media
3. Teacher show Picture - picture material Genetics (chromosome ) gene
4. Teacher Explain concerns with material learning
5. respectively - respectively participant educate look closely picture
6. Teacher share sheet Work to participant educate

## METHOD

Study This is Study Action Class (PTK). Design Which used in study This is Kurh And Lewing (2007; 17), with every cycle consists from four stages that is planning, implementation, observation, And reflection. Study give benefit form repair practical, like Teacher overcome various problem Study And difficulty teach his students. Evaluate is There is impact positive on behavior need criteria success Which set before action. Preparation, started with activity reflection This, become important For plan cycle activity next.

Activity study This done in two cycle, after reflection, Which covers analysis And evaluation process behavior, Because appear problem And thinking new Which need planning repeat, observation repeat, reaction, And reflection. 1 October until 22 December 2022, period odd in SMAN 1 Tasikmalaya. Subject study class act This is student class XII MIPA 8 SMAN 1 Tasikmalaya Which amount 35 student, consists from 21 Woman And 14 man.

Technique collection data which used in study This is technique observation. With instruction Which used form question pre test and post test. Analysis data results Study student on class XII. MIPA 8's done with analysis descriptive method percentage. Results Study student can seen from test on every cycle. Compare average mark test from Cycle 1 And Test Cycle 2 give data

enhancement results Study student. On cycle First we understand degrees understanding draft genetics, on cycle second we use it as material reflection behavior, And on cycle second we understand enhancement understanding draft genetics on studies biology, based on reflection cycle II done repair implementation process learning, next with cycle III .

Interesting conclusion from change mark test and non test from cycle 1 to cycle next show enhancement positive Which means activity Study increase And on the contrary means increase. Important For reflect and repair system learning Which applied furthermore. Results notes Good from interview nor questionnaire will disclosed in accordance with results Which collected between cycle 1 And cycle next. Indicator in study This are: 1. Increase results Study student in field material genetics 2. Presentation proficiency in learning classic by student Which has reach standard minimum KKM Which determined that is >80-80% completeness .

## RESULTS AND DISCUSSION

Objective study This is for enhancement activity and results Study student class XII-MIPA 8 SMA Negeri 1 Tasikmalaya on material genetics. because \_ that's find research to be discussed is results learning and indicators achieved performance \_ students in each of Cycle 1 and Cycle II. It's possible researcher For decide is will accept or reject hypothesis proposed action in study this.

Analysis results show that results Study student increase from Cycle 1 to Cycle II on conditions early . Summary results Study students in conditions initial, cycles I and II are shown in the table below this . Comparison level results Study students in Cycles I and II are shown in Figure 1.

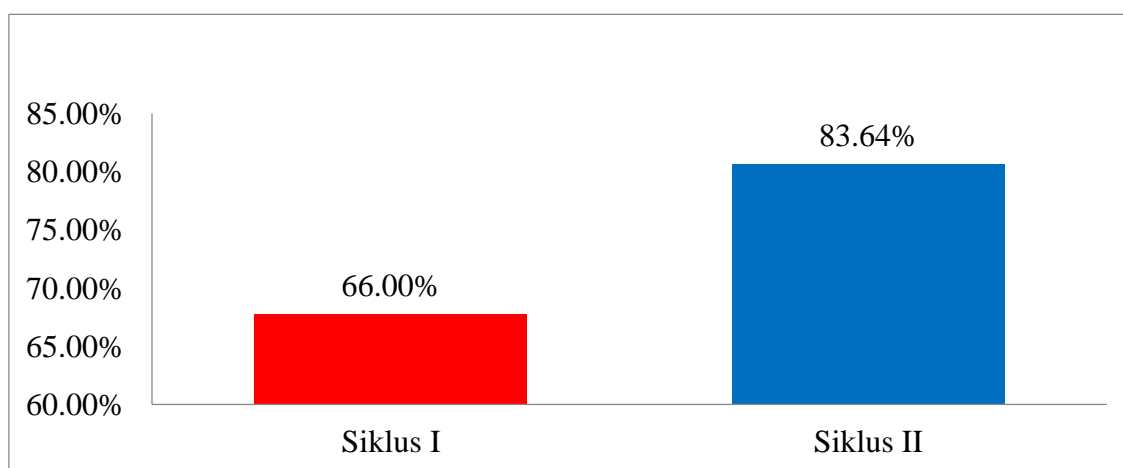


Figure 1. Comparison percentage results Study students in Cycles I and II

Based on picture 1, seen that exists enhancement results Study students from Cycle I to Cycle II. In Cycle I, the use of media images has been able to provide the percentage of student learning outcomes that is equal to 66.00% and has experience enhancement become 83.64 % on Cycle II. Kindly detail a

comparison of the increase in student learning outcomes Cycles I and II can be seen in Table 1 .

Table 1. Upgrade Comparison Results Student Learning Between Cycles

Category Student Grades	Cycle I	Cycle II
Score 66	10 students	-
Score 70	6 students	2 students
Score 75	4 students	-
Score 77	3 students	4 students
Score 80	12 students	10 students
Score 90	-	11 students
Score 95	-	8 students
Number of students completed	12	29
The number of students is not complete	23	6
Average value		
Completeness percentage	66.00 %	83.64 %

Table 1 show that results Study student increase every cycle. On Cycle I mark Lowest is 66 And mark highest is 80. On Cycle II mark Lowest is 70 And mark highest is 95. Impact positive to enhancement results Study student. kindly whole, use media picture increase results Study student and fulfil indicator completeness results Study Cycle I And Cycle II Which researcher identification. Use media picture has increased activity Study student between cycles. Comparison of student activity between cycles can be seen in Table 2.

Table 2. Comparison Student Activity Between Cycle

No	Aspect Which Observed	Mark Cycle I meeting n 1				Mark Cycle I Meeting n 2				Mark Cycle II Meeting n 1				Mark Cycle II Meeting 2				
		A	B	C	D	A	B	C	D	A	B	C	D	A	B	C	D	
1.	Student notice explanation Teacher		√				√				√				√			
2.	Student each other discuss in group			√				√				√				√		
3.	Students have courage For ask And answerquestion				√				√				√				√	

No	Aspect Which Observed	Mark Cycle I meeting n 1				Mark Cycle I Meeting n 2				Mark Cycle II Meeting n 1				Mark Cycle II Meeting 2			
		A	B	C	D	A	B	C	D	A	B	C	D	A	B	C	D
4.	Student capable do question in a manner individual			√				√			√				√		
5.	Student follow learning with active and orderly			√			√				√			√			

( Source: Data results year research 2022)

Information:

- A : Very good
- B : Good
- C : Enough
- D : Not enough

Based on Table 4.7, it can be seen that exists enhancement category activity student in the learning process from Cycle I to Cycle II. This signify that image media use has given that influence positive to enhancement results activity Study student become better. kindly whole image media use has can remind activity and results Study student become more better.

### CONCLUSION

Based on findings and discussion Study Action Class this, can concluded that: Use media picture can increase activity And results Study biology on material genetics on student class XII-MIPA 8 SENIOR HIGH SCHOOL Country 1 Tasikmalaya, so that enhancement results Study student can improved. Matter This proven from results observation Cycle 1 as big 66.00%. Data Cycle II and results also show enhancement on Cycle I as big 70% And Cycle II increase as big 80%.

### REFERENCE

Hamalik, O. (2002). Teaching Process Study. Jakarta: Bumi Aksara.

Ministry of Education .(2003). Constitution Republic Indonesia No. 14 Year 2003 About Master and Lecturer.

Gulo. (2002). Study Teaching Strategy Study. Jakarta: Grasindo.

Muslimin, I. (2000). Learning cooperative . Surabaya: University Press.

Mulyasa , E. 2006. Curriculum Implementation. 2004. Guide Learning KBK. Bandung: Rosdakarya.

Pratiwi, et. al. (2007). Biology For Senior High School Class XII. Jakarta: Erlangga

Prawoto. (1992). Understanding Teachers Biology Senior High School. Yogyakarta: IKIP Yogyakarta.

Rachmawati. et al. (2009). Biology for SMA/MA Class XII. Science Program. Jakarta. Ministry of Education.

Sardiman, A. M. (2004). Interaction and Motivation Teaching and Learning. Jakarta: Airlangga.



Sanajaya, W. (2007). Learning Strategy Oriented Process Standard Education. Jakarta: Prenada Media Group.

Sudijono, A. (2003). Introduction Education Statistics. Jakarta: Raja Grafindo Persada.

Syafaruddin. (2005). Management Learning. Jakarta: Rineka Cipta.