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## RESEARCH ARTICLE

### EFFECTIVENESS IN IMPROVING ATTITUDE MODULE IQRAM ON SCIENTIFIC TOPICS REPRODUCTION SYSTEM

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#### ABSTRACT

The purpose of this study was to determine the effectiveness of the teaching system of module IQRAM reproduction on the scientific attitude. Study on quasi experimental design "non-equivalent control group design" pre-test and post-test. Respondents a total of 184 students form IX divided group treatment and control group. The treatment group, while the IQRAM module using control group of conventional teaching. The instruments used are scientific attitude questionnaire contains two sub construct which are namely curiosity attitude and cooperation that has measured the validity. Analysis of the findings carried out descriptively which later inferential analysis followed by using t-test, MANOVA and MANOVA factorial. The findings show that there is a significant difference of treatment group using the group control module IQRAM compared using conventional teaching. This research provides the scientific implications of attitudes among secondary school students of low grades IX in Makassar, Indonesia.

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#### INTRODUCTION

Scientific attitude as inquisitive and attitude of cooperation until the expected to impact positively on the student (Syah 2006). One way to develop a scientific attitude is to treat students as young scientist while students learning science activities (Depdiknas 2006). Further, Harlen (1996) stated that science literacy is owned by someone manifested with the ability to see and study something scientifically and see whether the description of a phenomenon of evidence-based or otherwise. The problem of students who do not understand the lessons of science is closely related to the students ability of majoring scientific attitude. The weakness of scientific attitude will affect the process of teaching science in the classroom. The use of the scientific method in science education should be enhanced in the process of teaching and learning. Biological subjects is compulsory subjects for lower secondary school students across to Indonesia. In this study a topic that is taught to perform the process of learning to teach is the topic of reproductive system in humans (Depdiknas 2009). The lack of student involvement in learning activities directly to make students often find difficulty in understanding biological concepts especially on the topic of this reproduction system because the activities conducted in schools have not been based on scientific attitude. Learning activities that may be needed to train students to be creative, scientific, and independence and supported by an accurate way of materials.

Therefore, to get a good expansion plan and interactive learning, then various teaching media in the form of teaching modules are required. Accordingly, this study developed a learning module. The findings Yustina (2010) and Attwood *et al.* (2005) stating that modules provide opportunities for teaching and interactive learning and effective and to enhance various skills. A module is a teaching and learning units that discussed a specific topic systematically and sequentially, which aims to facilitate students learn alone and can dominate a learning unit easily and accurately (Sidek Jamaluddin 2005).

The researchers build module named module which is the abbreviation of the IQRAM Inquiry, Question, Repeat, Action and Moral has been renovated with the contextual approach Crawford (2001) which REACT Strategies (Relating, Experiencing, Applying, Cooperating, Transferring) by embedding the scientific skills component was built because the term is an acronym which IQRAM vivid. Further these five phases this integrated with the contextual in the IQRAM module can be found in each module units performed sequentially and mutual dependability. Contextual teaching should be implemented using five strategies as revealed by Crawford (2001) strategy connects hooks, experience, use, collaborate and move. The purpose of the five strategies are used in order to give teachers teaching emphasis toward relationship between biological concepts with real life situations.

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- **Connecting Strategy:** incorporate life experience whatsoever of a student or students ' existing knowledge with new concepts. Inquiry Phase
- **Experience Strategy:** involving students in exploration, discovery and invention, by the use of manipulative, problem-solving activities and laboratory activities. Manipulative are simple objects that are used to modeled the concept of abstract into a more concrete form. Phase 2 Question
- **Using Strategy:** focus on how knowledge can be used through exercises and problems that are relevant and realistic in the real world. Emphasis and concentration given to the relevant task and exist in daily life. Phase 3 Repeat
- **Cooperation strategies,** teachers divide students into specific groups to the activities considered to be complex so that students can share their knowledge, respond and communicate one with another. Phase 4 Application
- **Migration provides** an opportunity for students to apply knowledge in new contexts or situations new experience to the student and student's curiosity as a source of motivation for students transferring from one context to another context. Phase 5 Morale

This module takes into account the IQRAM five teaching components such as pre-teaching, presentation of information by teachers, student involvement in activities in the module has been described as carrying out measures for mastering the concepts and skills in every activity undertaken until students are able to apply concepts that have been learned in daily practical students.

### The purpose of the study

To achieve these purposes, the question of the study are as follows:

1. Is there a difference on the scientific attitude among students in groups and conventional IQRAM group.
2. Is there a significant main effect of group and time trials on the sub.scientific attitude
3. Is there a significant interaction effect of group and time trials on the sub.scientific attitude

### Study hypothesis

Further, to answer questions in research, then be able to summarize the built the main hypothesis refers to the question of the study as follows:

- Ho1 There is not a significant difference in mean score of pre-test and post-test student scientific attitude in the Group and the Group's conventional IQRAM.
- Ho2 There is not a significant main effect of group and time trials on the scientific attitude
- Ho3 There is not a significant interaction effect of group and time trials of sub student scientific attitude.

## MATERIALS AND METHODS

This study was quasi experiment method. Experiments carried out against the treatment group using the group control module IQRAM and using conventional learning.

### The design of the study

Study on quasi experiment carried out to look at the effectiveness of the IQRAM module in enhancing students ' scientific attitude. In this study, researchers used the test design approach and posttests (Campbell Stanley) as summarized in Table 1 below.

**Table 1. Design Group Treatment and Control Group Pre-test and Post-test**

Collection	Pre-test	Teaching Strategy	Post-test
Treatment	O1	X1	O2
		Module IQRAM	
Treatment	O1	X2	O2
		Conventional	

Hint:

O1 = Pre-test ,

O2 = Post-test

X 1 = batches using module IQRAM

X2 =batches of conventional

### Respondents

Respondents are the form of nine high school students (SMR) in the city of Makassar in Indonesia. Students who are selected in this study was a total of 184 people out of which a total of 92 people from group treatment and 92 people from the control group. Random sample selection aims (purposive sampling). For determining the control group and treatment group.

### Research instrument

The instrument used to assess the scientific attitude questionnaire consists of pre-test and post-tests. Pre-test conducted prior to the study conducted for quasi experiment identifies scientific attitude based on equal level demographics embroiled. Post-tests carried out after the entire educational materials and activities taught at the end of the learning process at group treatment and control group. In the pre-test and post-test scientific attitude which consists of two sub-contract and curiosity attitude of cooperation. Questionnaire on the attitude of students to increase the reliability of scientific instruments are analyzed using SPSS 19 for see's alpha. The result analysis of scientific attitude questionnaire as in Table 2.

**Table 2. The Reliability of the Scientific Attitude Questionnaire Instruments**

No	Subconstruct	Amount of Problem	Alpha Croanbach
1	Curiosity	3	0.78
2.	Cooperative	3	0.80

Table 2 shows the reliability of the scientific attitude questionnaire instruments in good status. At each student's scientific attitude sub contract on sub contract inquisitive with Alpha Croanbach value of 0.78 and Cooperation value 0.80.

This means that students ' scientific attitude questionnaire can be used in the actual study with Alpha croanbach value 0.78 up to 0.80. Scientific attitude questionnaire used in the treatment group and the control group in this study.

## Procedure Analysis

In experimental studies, to see the effect of the treatment is done on the subject, the analysis should be done carefully (Hair *et al.* 1995). Descriptive analysis was performed (mean score standard deviation) and inferential analysis of t-test, MANOVA and MANOVA factorial used. The overall data analysis over each group i.e. group a treatment and control group.

## Study Findings

Analysis of student's scientific attitude and treatment control group can be seen clearly from the inferential analysis carried out using independent t-test, MANOVA and MANOVA factorial. However, inferential analysis is carried out before then do test Kolmogorov-Smirnov normality to identify the distribution of data, while Levene tests carried out for the identification of homogeneity Variant (Chua, 2006). Kolmogorov-Smirnov test results as shown in Table 3 below.

**Table 3. Normality Data Exam Review Decision**

Methods	Kolmogorov-Smirnov		
	Statistic	df	Sig.
Module IQRAM (Treatment)	0.087	92	0.052
Conventional (Treatment)	0.085	92	0.060

Table 3 shows the test results normality by using the Kolmogorov-Smirnov scientific attitude at pre-test. Significant value (sig) which is accessed is 0.052 for control group and 0.060 for group treatment. Significant value both groups is more than significant level of 0.05 ( $p > 0.05$ ). It means that there have been significant differences in the distribution of data for both groups. This decision has met the first assumption in using independent t-test. Further test of homogeneity of variance was carried out by using Levene test. Test results of homogeneity of variance as in Table 4.

**Table 4. Homogeneously Test Variance Decision Review**

Levine Test (F)	df1	df2	Sig.
0.011	1	182	0.917

Table 4 shows the results of the test of homogeneity of variance between the control and treatment groups. Levine test results get  $F = 0.011$  with significant value (sig) 0.917. Significant value exceeds 0.05 significant level ( $p > 0.05$ ). It means that there is no difference in the variant data. Thus the data is homogeneous. Descriptive analysis of the pre-test results and post can be seen from the scientific attitudes mean score as in Table 5.

**Table 5. Stats Pre and Post Treatments and Collection of Scientific Attitude control**

	Module IQRAM		Conventional	
	Pre	Post	Pre	Post
N	92	92	92	92
Min	3.45	3.99	3.51	3.58
Standard Deviation	2.86	2.91	2.93	3.042
Minimum	2.98	3.76	3.03	3.11
Maximum	3.84	4.12	3.96	4.03

In Table 5 also shows the mean values of the scientific attitude in pre-test happens which means increase. The mean value of the scientific attitude in the pre-test and post-test module group rose 3.45 IQRAM be 3.99. For conventional group increased 3.58 3.51 becomes. Based on the standard deviation obtained shows that the scientific attitude at pre-test not happened a significant difference. This means that before a student's ability in intervenes made the group more diverse than IQRAM module the ability of students in the conventional group. While the standard deviation on the posttest occurs an increase in group module IQRAM compared conventional groups. This means that after the intervention capability of the student groups performed module IQRAM is higher compared to the conventional group. Whereas, based on the minimum and maximum values on the test post on Table 5 shows an increase in the minimum and maximum scores once performed for the rest of the group by intervention the maximum value on the post test, namely the IQRAM module at 4.12 group and the maximum value of the conventional group 4.03. This means that happens improvements does not mean 0.09 at scientific attitude.

## Hypothesis testing

Inferential statistics used in this study to answer hypotheses of the study. Is there a difference on the scientific attitude in human reproduction system topic in between the conventional treatment group and the conventional group. The treatment group using the group control module IQRAM and conventional learning. Inferential statistical analysis results can be seen from the mean pre-test and post-test scores the attitude of students' scientific as in Table 6.

**Table 6. pre-test and post-test student scientific attitude and treatment control group**

Test	Scientific Attitude	Kumpulan	N	Min	Standard Deviation
Pre	Curiosity	Module IQRAM	92	3.47	0.489
		Conventional	92	3.50	0.517
	Cooperative	Module IQRAM	92	2.98	0.377
		Conventional	92	3.03	0.376
Post	Curiosity	Module IQRAM	92	3.76	0.488
		Conventional	92	3.53	0.527
	Cooperative	Module IQRAM	92	4.00	0.376
		Conventional	92	3.11	0.386

In Table 6 show that students in groups and conventional IQRAM module group curiosity attitude and cooperation has almost the same. Experimental study of meaning that can be carried out on the group and do a comparison because the group is homogeneous. This indicates the null hypothesis ( $H_0$ ) that there was no significant difference in the mean test score students' scientific attitude in the pre group and the Group module is conventional IQRAM accepted.

This shows that between both groups, namely the group of modules with conventional IQRAM group has sub scientific attitude of students at the same level. Curiosity aspects of module group mean score 3.76 IQRAM owns ( $sp = 0.488$ ), while conventional group showed a mean score of 3.53 ( $sp = 0.527$ ). In terms of mean scores indicate that students value min IQRAM module curiosity higher than students in the conventional group.

Nevertheless, in collaboration with the students showed that the group had a mean score of modules IQRAM 4.00 (sp = 0.376), while conventional group showed a mean score of 3.11 (sp = 0.386). In terms of mean scores indicate that students group mean score IQRAM module has a higher cooperation from students in the conventional group.

In addition, the mean score of students cooperation between groups with conventional IQRAM module group also matching the IQRAM module 2.98 (sp = 0.377) and conventional group 3.03 (sp = 0.376). It is shown that the attitude of cooperation the two groups before there were interventions made significant difference between groups. This finding reinforces data analysis that students in groups and conventional IQRAM module group has almost the same attitude of cooperation. Experimental study of meaning that can be carried out on the Group and do a comparison because the group is homogeneous.

This shows the null hypothesis (Ho 2) that there was no significant difference in the mean test score students in post-graduate scientific attitude module group and conventional group was IQRAM in decline. This means, that there are significant differences in the mean test score students in post-graduate scientific attitude module group compared to conventional group IQRAM. With other words, the overall mean score for every aspect of scientific attitude at sub increased after the "treatment" is carried out. For viewing scientific attitudes mean score of students in more detail, Note Figure 1.

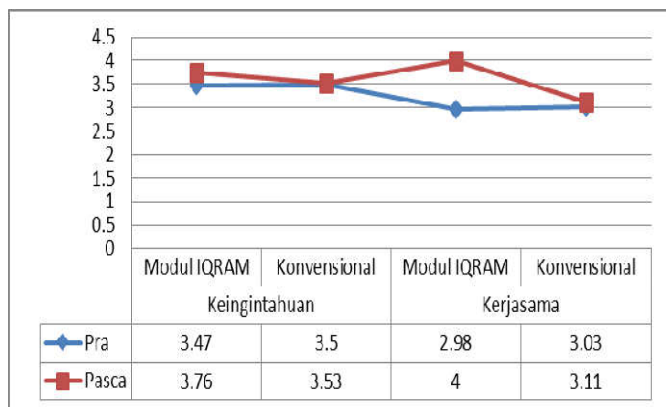


Figure 1. Charts a Mean Score of Pre-Test and Post-Test Student Based On Scientific Attitude Group

The results of the analysis of factorial MANOVA was run to see the contrast of the student scientific attitude sub can be seen as in Table 7. Table 7 shows that there are differences in scientific attitude based on significant student group to Wilks' = 0.611, F (38.085) = 0.000 (p < 0.05). Students scientific attitude differences significant also occur based on test time with Wilks = 0.469, F (67.787) = 0.000 (p < 0.05). Similarly, the attitude of the student scientific, there is significant difference scientific attitude based on group interaction and time tests with Wilks' = 0.553, F (48.417) = 0.000 (p < 0.05).

This shows the null hypothesis (Ho 2.1) that there were no significant effects for the main group of scientific attitude was less sub. Therefore, it can be deduced that there is a significant effect of the Group's scientific attitude. sub And the null hypothesis (Ho 2) that there were no significant effects for the time of home test against scientific attitude was less sub. This means, that there are major effects for the group and a significant test time of student scientific attitude.

Based on Table 8 shows that on the basis of the group, there was no significant difference in curiosity with the value F = 3.442 and sig = 0.064 (P > 0.05) between the group and the control group IQRAM module. While in terms of cooperation, there is a significant difference in the attitude of cooperation with the value F = 111.966 and sig. = 0.000 (P < 0.05). That means that there is a significant difference between the group cooperation attitude IQRAM module and control group. Then there is a significant difference in frugality with the value F = 45.666 and sig. = 0.000 (p < 0.05) based on the group.

Based on the descriptions above, can be concluded that the main effect of the group occurred against aspects of the attitude of cooperation. The group's principal effects didn't happen against aspects of curiosity because there is no significant difference. Table 8 also shows the results of an analysis based on time trials. The results analysis of MANOVA show that based on the time of the test, there is a significant difference in curiosity with the value F = 9.990 and sig = 0.002 (P < 0.05) between the pretest and posttest. While in terms of cooperation, there is a significant difference in the attitude of cooperation with the value F = 192.640 and sig. = 0.000 (P < 0.05). That means that there is a significant difference between the pre-test attitude of cooperation and posttests. Therefore, the hypothesis (Ho 3) there was no significant interaction effect of group and time tests against scientific of students are rejected.

Table 7. Group Effects and Time of MANOVA Test

Effects	Wilk's Lambda	F	D.K Between of Summary	D.Kin Summary	Sig.
Summary	0.611	38.085	6	359	0.000
Time of Exam	0.469	67.787	6	359	0.000
Summary*Time of exam	0.553	48.427	6	359	0.000

Table 8. Test of Between-Subject Effects of Student Scientific Attitude

Sources	Scientific Attitude	Type III Sum Of Squares	Df	The Mean Square	F	Sig.
Summary	Curiosity	0.880	1	0.880	3.442	0.064
	Cooperative	16.111	1	16.111	111.966	0.000
Time	Curiosity	2.556	1	2.556	9.990	0.002
	Cooperative	27.720	1	27.720	192.640	0.000
Summary	Curiosity	1.479	1	1.479	5.783	0.017
*Time of Exam	Cooperative	20.254	1	20.254	140.754	0.000

Based on the description of the results of the effects of major and MANOVA effect test of interaction time of student scientific attitude, be concluded that the main effects and interaction effects on the aspect of time tests take place curiosity collaboration, and attitude. Therefore, it can be deduced that the two students' scientific attitude sub construct there is a significant difference.

From the results overall in MANOVA sub construct student scientific attitude there is interaction effects on the scientific attitude, namely curiosity and cooperation. Therefore, that there was no effect of group and time interaction a significant test to the sub element and scientific attitude less confident students are accepted. Next result effect interaction between group and time trials on the scientific attitude above shows that the effect of the interaction of the Group and the most significant test time occur in the aspect of curiosity with  $F = 5.783$  and  $\text{sig} = 0.017$  ( $P < 0.05$ ). Thus, the null hypothesis ( $H_03$ ) that there was no significant interaction effects for the Group and time trials on the scientific attitude is less sub. Interactions occur as in Figure 5.4.

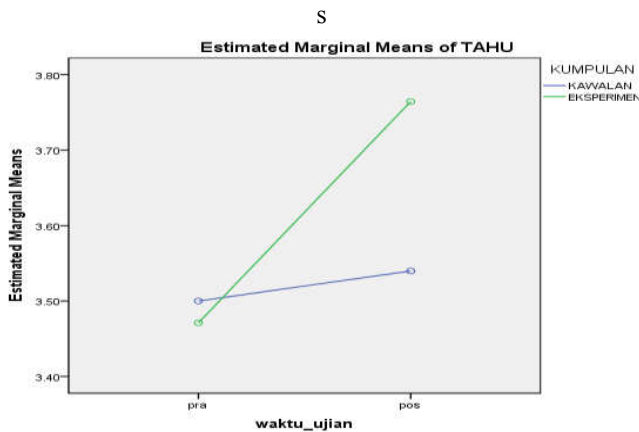


Figure 2. The Interaction between Collection Time Test against Scientific Attitude Which is Curiosity

Figure 2 shows that the interaction occurs between the Group and the time trials on the scientific attitude, namely student sub especially on aspects of curiosity. Happens the increase in mean score on curiosity aspects of the pre-test to posttest which students in the higher group comparison module IQRAM conventional groups. This means that the treatment group is higher than the conventional group. This indicates that the null hypothesis ( $H_03$ ), there was no significant interaction effects for the Group and the test time is less. From the description, be concluded that having done the test of between-subject effects changes significantly have any significant effect on the attitudes of students scientific sub-group (curiosity and cooperation) and the main effect of test time sub scientific attitude and the impact of student group interaction and time tests only happened at the curiosity aspect.

## DISCUSSION

One of the ways to improve the attitude of teachers done scientific students of jurisprudence in the use of teaching AIDS strategy, used, tasks, activities that are challenging for students.

Enjoyment in learning can develop students' scientific attitude (Kamisah *et al.* 2003). The results of this study support the view, that the use of modules to increase the scientific attitude IQRAM students. This is evident as a whole in this study showed a difference of scientific attitudes mean score in post-tests than group IQRAM modules and there is a significant effect of a conventional and a significant interaction between group and time trials. This means that the use of the modules has been able to enhance the IQRAM, scientific attitude towards the education of biology students in particular are reproduction system topic. In this study, the highest increase in attitude occurred at curiosity, and the cooperation aspect. This means that the effect of the teaching strategies found in the IQRAM module developed by providing activities on teaching and studying can make existing students to do in carrying out the activities performed.

Up to the curiosity of the topics taught are very high. Activities done by students involving investigation judgment which enable them to identify problems to be researched, design procedures and subsequently concluded (Chiappetta Koballa, 2006) and confirm the existing principles of the students had the opportunity to learn actively, collaborating with and interact directly with the educational materials that can be found in the module to investigate the phenomenon of scientific attitudes (Hofstein Lunetta 2003). As a whole, the findings of this study support the view of parallel and Bricheno, Johnston and Sears (2000), that the scientific attitude is embedded positive result of direct experience with student activities in teaching and learning science, in particular in activities that provide the path to the active involvement of students

## Conclusion

Overall, the findings of this study support the view of parallel and Bricheno, Johnston and Sears (2000), that the scientific attitude is positive result of direct experience with student activities in teaching and learning science, in particular in activities that provide a path for the active involvement of students. Further, this study gives implications which i) role of teachers just as facilitator and mediator to improve student activity because student has been given a wide range because the issue of current problems and close to world terkait real must they settle or they want scientific basis and is responsible arrangement ii) teachers in the process of learning to implement effective and efficient learning with contextual-based; III) with the availability of the media learned in module IQRAM can be a good alternative to the system of teaching and learning in lower secondary school in Makassar, Indonesia.

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