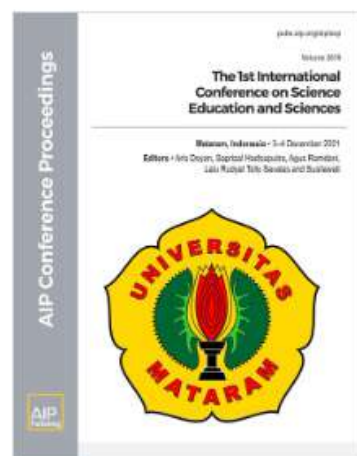


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# Analysis of the Relationship between Concept Mastery and Consistency of Moral Arguments Using Socioscientific Issues in the Topic of Human Reproductive Systems of Senior High School Students in Mataram

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**Abstract.** This study aims to analyze the relationship between conceptual mastery and the consistency of moral argumentation using socio-scientific issues in the human reproductive system material for high school students in Mataram. The research method used is correlational research with stratified random sampling technique. The population in this study were all senior high school students in Mataram. Data were collected from 300 students of 12th grade in three Senior High Schools using instruments in the form of a learning outcome test and a questionnaire on the consistency of moral argumentation. The consistency of students' moral arguments is measured using questions analyzed through the rubric of the adaptation of the consistency of performance criteria. The questions consist of 16 questions regarding socio-scientific issues with the categories of questions for yourself, different sexes, families and communities. Questions are given to the entire sample of students to then analyze any incoming data. The results show that in the three schools there was a significant relationship between the mastery of concepts and consistency of students' moral arguments even though the levels were in the low category. This study provides an overview of the conceptual mastery and consistency of moral argumentation of 12th grade students using sociocultural issues.

## INTRODUCTION

Biology continues to develop in lockstep with advances in science and technology, such as molecular biology and biotechnology. These technological advancements have both a beneficial and harmful influence on life since they enable humanity to overcome practical challenges and obstacles. The positive impact of biological advancement is the use of IVF for couples who are having difficulty reproducing, whereas the negative impact of technological advancement appears to be related to changes in human civilization, such as shifts in social dignity and those related to various ideational implications.

The growth of moral problems among teenagers, including drug abuse, pornography, sexual assault, and abortion, have developed into unresolved societal issues. This situation is extremely concerning for the community, particularly parents and teachers since the offenders and their victims are adolescents, particularly students.

Teens naturally have enormous sex drives, the majority of which are motivated by the desire to have sexual encounters. Without supervision, teenagers may get involved in prostitution, casual sex, premarital sex, and a variety of other inappropriate behavior. If this occurs and results in pregnancy, the most expedient course of action is almost always an abortion. According to [1], premarital pregnancy was more prevalent among those aged 17-18 than among those aged 19 and older. Until January 2011, five young women on average acknowledged having had sex prior to marriage. Their pregnancies range in age from second-grade junior high school kids to university students.

Education, in fact, is the primary factor contributing to the present moral change. According to [2], knowledge is one of the variables that might influence moral growth. Awareness of abortion and its consequences might instill in

pupils a strong desire to resist. From elementary through secondary school, biological science should be able to give a solid foundation for students to create their own judgments of beneficial or terrible conditions.

Education regarding free sex and abortion is inextricably linked to the biology topics addressed in the chapter on Reproductive Systems. Teens who are decent in their own right will demonstrate it by their moral judgment or reasoning, as well as through their excellent, proper, and ethical behavior [3]. Given the prevalence of moral aberrations nowadays, the role of teachers in the area of moral education is extremely difficult.

In informal reasoning, an appraisal of a person's positive and negative characteristics influences decision making. A person's moral growth has an effect on his judgment. The process of constructing and assessing reasonable arguments may be quantified via an analysis of moral reasoning. [4] argues that socio-scientific topics are ideal for applying judgments to one's attitudes since they are complicated, accessible, and controversial. Moral judgment is affected by various of factors, including emotional factors, social influences, personal experiences, and the complexities of perceptions. Making decisions on socio-scientific issues entails an internal negotiation process between two opposing claims, judging the veracity of a statement, and taking calculated risks based on the evidence.

Advances in technology and developments in science have increased the complexity of social concerns. If someone's informal reasoning is underdeveloped, it will be difficult to respond to and make judgments on socio-scientific concerns. Based on this, the researcher conducted a study on the relationship between conceptual mastery and consistency of moral argumentation using sociocultural issues in the human reproductive system material for high school students in the city of Mataram.

## METHOD

Correlational research was performed to conduct this study. This research use correlation coefficients to quantify the level of correlation between two or more quantitative variables [5]. The Spearman Correlation Test was used to perform the analysis in this study. The dependent variable in this research is the consistency of moral argumentation, whereas the independent variable is conceptual mastery.

The population for this research consisted of all 12th-grade students enrolled at senior high school in Mataram. Stratified Random Sampling was used to determine the sample for this study. The sample is composed of two to three sample classes drawn from the 12th class in each school. As a result, a total of 300 12th-grade students from three schools were included in the sample.

The consistency of students' moral arguments is assessed via the use of questions examined using the rubric of the adaptation findings for the consistency of performance standards [6], which are listed in table 1. There are sixteen questions pertaining to socio-scientific issues, divided into categories including questions for oneself, different genders, families, and communities. The moral argumentation consistency test was administered to 12th-grade students at senior high schools in Mataram. Biology concept mastery was determined in this research from the test scores of the Reproductive System material. This data was collected from 12th-grade students at senior high schools in Mataram.

**TABLE 1.** Moral argument consistency instrument grid [6]

No.	Indicator	Score
1.	The student's argument includes different statements from each answer for themselves, different genders, families and other people.	1
2.	The student's argument includes 2 statements of each answer for themselves, different genders, families and other people.	2
3.	The students' arguments include 3 statements of each answer for themselves, different genders, families and other people.	3
4.	The students' arguments include 4 equal statements for each answer for themselves, different genders, families and other people.	4

## RESULTS AND DISCUSSION

### Results

Correlations between biological concept mastery and moral argumentation consistency were evaluated and assessed using Microsoft Excel 2013 and SPSS 23 programs. The test started with the Kolmogorov-Smirnov Normality Test and indicated that the acquired data were not normally distributed at a significance level of less than 0.025. As a result, the data were examined using a Non-Parametric Test, specifically the One-Sample Kolmogorov-Smirnov test (Table 2). The statistical test for concept mastery revealed a value of 0.109 with a significance level of 0.00, while the consistency of argumentation showed a value of 0.158 with a significance level of 0.00. The test used in this study is a two-way test, which ensures that the findings are significant at a level greater than 0.05. The results from this test demonstrate that the significance level is less than 0.05, indicating that the data are not normally distributed.

**TABLE 2.** One sample kolmogorov-smirnov test.

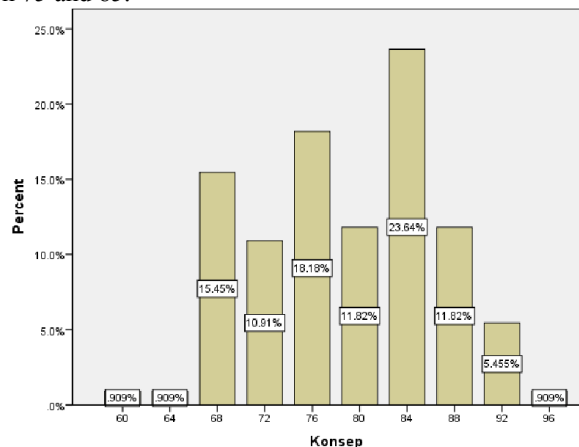
	<b>Concept Mastery</b>	<b>Consistency of Moral Arguments</b>
Kolmogorov- Smirnov	0.109	0158
Asymp. Sig. (2-tailed)	0.00	0.00

The relationship between conceptual mastery and the consistency of moral argumentation was analyzed statistically using the Spearman Correlation Test for 300 students in grade 12. This test demonstrates that there is a correlation between the two of them, accounting for 0.291 (Table 3). The significance level is 0.000, which is considerably less than 0.025, indicating that there is a correlation between conceptual mastery and moral argumentation consistency. A positive number implies that there is a correlation between the two variables indicating that when conceptual mastery is strong, moral argumentation is likewise solid.

**TABLE 3.** Spearman correlation test between concept mastery and consistency of moral arguments.

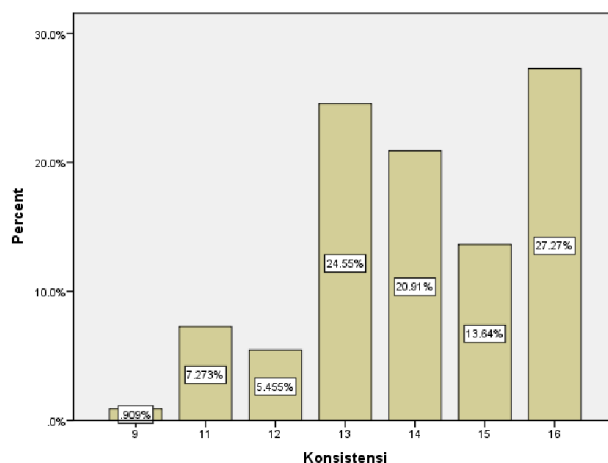
	<b>PK and KAM</b>
Correlation coefficient	0.291
Sig. (2-tailed)	0.000
N	300

For 12th-grade students, the acquisition of the concept mastery score in Reproductive System material ranges from 68 to 90, with a minimum score of 44 and a maximum score of 96. Biology learning outcomes had an average score of 78, with a standard deviation of 12. According to Graph 1 of the distribution of concept mastery scores, the range with the most points is between 75 and 85.



**FIGURE 1.** Distribution of concept mastery scores for 12th-grade students.

The results of the consistency of students' moral arguments obtained the lowest score with a score of 9 and the highest score of 16 from the maximum score of the consistency of the students' moral arguments, namely 16. Most of the students obtained scores in the score range 11-16 (Graph 2).



**FIGURE 2.** Distribution of test results for the consistency of moral arguments for 12th-grade students.

## Discussion

Concept mastery is critical for learning because it enables students to increase their intellectual competency, assists them in resolving issues, and makes learning more engaging. A person is considered to have mastered an idea if he or she fully knows it to the point that he or she can express it using his or her own words, without altering the meaning inherent in it. Moral development of students is influenced by the educational process that occurs in their surroundings. Educational institutions have the power to exert influence on the character and quality of a person's life as a result of an interacting cause and effect relationship between the person's behavior and their environment. Someone with a high level of conceptual mastery may be considered to have a high level of moral argumentation consistency if their decision-making on socio-scientific issues is logically organized in their arguments.

The correlation test findings on students from school A, school B, and school C are consistent with earlier studies done by other researchers. The findings indicated that there was a significant relationship between conceptual mastery and the consistency of students' moral arguments in all three institutions, despite the fact that the level was in the low category.

Overall, they correctly answered a large number of questions on the indicators of identifying the tissue structure of male and female reproductive organs, explaining the function of the tissue that makes up the male and female reproductive organs, and analyzing the relationship between the structure and function of the tissues that make up the male and female reproductive organs. Students' responses to the questionnaire on moral argumentation consistency do not accord on the socio-scientific case issue presented. The response with the largest areas of dispute was abortion and transgender, whereas 90% of students agreed on IVF and as many as 60% agreed on uterine leasing.

Based on the above theoretical study and research results, it can be explained that there are factors that can affect the results of research regarding the mastery of concepts and consistency of students' moral arguments, namely the adjustment between emotional and social, family education methods, and learning achievement. Individual emotional and social states differ from one another. Various emotional and social attitudes include being quiet, shy, brave, easy to react, happy to work together, like to isolate themselves, easily influenced, sensitive, being dependent on others. This emotional and social behavior can change according to the surrounding conditions and situations. This situation has a big influence on students' learning activities and success. In addition, emotional impulses can influence his thoughts and behavior. An individual is more directed by objective reasoning and considerations in responding to something.

The condition of the family has a big influence on the individual because it can cause individual differences that are motivated by differences in family circumstances. The effect occurs in differences in terms of experiences,

attitudes, appreciation, interests, economic attitudes, ways of communicating, speaking habits, cooperative relationships, thinking patterns, and so on. The differences in these matters affect how to behave and change learning in schools.

The consistency of students' moral arguments is integrated into the concept of super-ego which is formed through the internalization of prohibitions or commands that come from outside (especially parents) so that it is finally scattered from within oneself [7]. Students who did not have a harmonious relationship with their parents in childhood are likely not able to develop a super-ego strong enough so that they can become people who often violate societal norms. Parents must have the same attitude and treatment as well as prohibit or allow certain behavior to children. A child's behavior that is prohibited by parents at one time must also be prohibited if it is repeated at another time.

Indirectly, the attitude of the parents towards the child, the attitude of the father towards the mother, or vice versa, can influence the child in responding to something, namely through the imitation process. The attitudes that parents should have are affection, openness, deliberation (dialogue), and consistency. Parents are role models for children, including role models in practicing religious teachings. Parents who create a religious climate by cleaning teachings or guidance on religious values to their children will experience the cultivation of a good attitude.

Differences in learning achievement among students are caused by factors such as maturity, personal background, attitudes and talents towards lessons, and the type of learning provided. The results of the interview with one of the students who got a low category concept mastery score (<67) and the consistency of the argumentation in the consistent category had problems in terms of lack of understanding of the material given. The student answered incorrectly on the questions with indicators explaining the function of hormones related to the reproductive system in men and women and the indicators applying an understanding of the principles of the mechanism of action of human reproductive organs and hormones.

Each student's mastery of concepts will differ depending on the initial circumstances or student input. This is in line with the consistency of the students' moral arguments. If students have a high mastery of concepts it will be easier to solve the problems they face and will always be consistent in solving these problems. A person's mastery of concepts will increase depending on the experience he has experienced. The more students have experience in solving problems, the more consistent they will be in solving these problems. This shows that the development of students' conceptual mastery will affect the students' thinking patterns in interpreting a problem and solving the problem consistently.

## CONCLUSION

Based on the results and discussion, it can be concluded that there is a correlation between mastery of concepts and consistency of moral argumentation using sociocultural issues in human reproductive system material for high school students, particularly in the city of Mataram.

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