The consistency of the students' arguments in the socioscientific issue about cloning on extinct animals, animal for sacrifice (Qurban) purposes and human

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Abstract. Argumentation plays an important role in the development of science which is not just finding and presenting facts, but building arguments and considering them, and debating various explanations about phenomena. The research aimed to capture the consistency of students' argumentation on issues of cloning. Students were chosen purposively with the subject of 170 high school students from three high schools in Bandung City, West Java, Indonesia. This research uses a case study approach with a descriptive analysis to analyze student test results of argumentation. The consistency of argument consists of claims and reasons itself. The result shows the pattern of agreeing and disagree about cloning in 3 topics; 1) extinct animals, 2) animal for Qurban purposes, 3) humans. The higher consistency showed disagree in topics 2&3 about 56.47% and consistency of reason for each topic are 1) science 83.5%, 2) religion 57.6% and 3) religion 40%. Then, the consistency of agreeing for all topics is 2.35% and disagree is 14.71%. This provides that, consistency of students argumentation on cloning issue is greatly influenced by science, religion, and social norms. It needs to be investigated further to uncover the relationship of arguments consistency with socio-cultural of students in schools.

1. Introduction
A major goal of the science curriculum is for students to develop an understanding of the scientific view of the world and to be able to use scientific reasoning when a situation requires it [1]. Improving the ability of young people to construct arguments about controversial science topics is the desired outcome of science education. Angell [2] defines an argument as a conclusion supported by at least one reason. Govier [3] distinguishes argument from the explanation in holding that in an argument the conclusion should also be uncertain. Now we may ask what, then, is a scientific argument? Certain qualities come to mind; for example, the argument should be supported by empirical evidence, or at least capable of being verified, falsified, or weakened by such evidence [4]. The purpose of such arguments should be to explain some phenomenon in the natural or social world [5].

Many argumentations are used as an important component in relating scientific education and its material content understanding [6]. In its application in the world of education, the socioscientific
issue has become important in science education since it serves a central role in scientific literacy process [7]. Science literacy requires the ability to discuss, interpret relevant evidence, and draw conclusions related to the socio-scientific issues. Driver, et al. [8] putting socio-scientific issues in the learning process is important in order to produce a responsible society which is able to apply scientific knowledge, and have thinking ability.

Cloning in animals is a topic in a biology course at high school. Cloned animals can be produced following nuclear transfer (NT) with embryonic or somatic cell types. NT enables a differentiated nucleus to be reprogramed to a totipotent state when exposed to an oocyte cytoplasmic environment. However, epigenetic reprogramming is often incomplete with developmental errors, resulting in a continuum of an embryo, fetal, and postnatal mortality. Although most clones that survive to adulthood, and their sexually-derived progeny, might appear physiologically normal, there is evidence of subtle epigenetic differences compared to conventional animals. Despite this, the meat obtained from cloned livestock and their progeny appears safe to consume encouraging commercial adoption in some countries [9]. The phenomenon of cloning on extinct animals, animals for Qurbani purposes and human are contradictory in sociocultural perspectives.

Sociocultural perspectives describe the individual condition and how their behavior is influenced by special factors in surrounding socio-cultural environment. A personal development study is not only on the individual or on the environment aspect but also on the social and cultural context [10]. Vygotsky [11] with his sociocultural theory stated that students acquire various knowledge and skills through interaction with their social environment. Thus, constructing knowledge is a social process involving communities in their environment. Rogof [12] believes that argumentation activities are part of a social process to develop scientific discourse in learning science. Argumentation is also an important tool for teaching critical thinking [13] thus, critical thinking skills are very essential in socializing today, especially in a sociocultural perspective. Then, in this research will discuss the consistency of the arguments conveyed by students about the issue of cloning which is related to the socio-cultural of students in Indonesia. The consistency of argument consists of consistency of claims and reasons itself, and the pattern of reason in each level of schools.

2. Methods
The case study method is chosen to identify the consistency of students' arguments toward issues in cloning topics. In this study, refer to Yin [14] a case study method with a qualitative descriptive approach with quantitative evidence, from the results of students' written argumentation tests and equipped with interviews with teachers. Three groups of the subject are studied. The first group are students of a middle level of a private high school, with 21 male students and 25 female students. The second group are students of a lower level of a public high school, with 25 male students and 43 female students and the third group are students of a middle level public high school, with 28 male students and 28 female students in Bandung, West Java, Indonesia. The student's age range between 15-17 years. Research subjects are sampling purposively. The argumentation is adapted from Toulmin’s argumentation pattern, and the consistency of argument is measured from the written arguments between claim and reason. Instruments given are questions in the context of cloning. The research phase consists of a preparation phase, implementation phase, data analysis phase, and data interpretation phase.

Instrument making by using expertise validity assessment in preparation phase; then instruments given in three subject groups are conducted outside of classroom learning in the implementation phase; then analysing the collected data results in data analysis phase, and finally the results of the analysis is then interpreted in the form of case study report in data interpretation phase.

3. Result and Discussion
3.1. The consistency of argumentation claim of high school students
The test of students written argumentation consist of three topics of cloning: I) extinct animals, II) animal for sacrifice (Qurban) purposes and III) human. The results of the consistency of
argumentation claim in Figure 1, related to issues about cloning showed students agree are 37 students or 21.8 % for topics I&II, 7 students or 4.1% for topics I&III, 0 student or 0% for topics II&III and 4 students or 2.4 % agree for all topics. Figure 1 shows that students highest claim (21.8%) of agreeing for topic cloning of extinct animal and cloning of animal for Qurbani purposes. In this case, show that the students agree toward purposes of cloning for the environment sustainability and Qurbani purposes. Then the students lowest claim (0%) of agree for topic cloning of animal for Qurbani and cloning of human.

![Figure 1. Consistency of students agree claim](image1)

![Figure 2. Consistency of students disagree claim](image2)

The results of the consistency of argumentation claim in figure 2, related to socio-scientific issues about cloning showed students disagree are 96 students or 56.5 % for topics II&III, 1 student or 0.6 % for topics I&III, 0 students or 0% for topics I&II and 25 students or 14.7 % disagree for all topics. Figure 2 can more clearly illustrate the results of the disagree consistency of students argumentation claim. Figure 2 shows that students highest claim (56.5%) of disagree for the topic animal for sacrifice (Qurban) purposes and cloning of human. In this case, show that the students disagree toward cloning for Qurbani purposes and human. Both of the topics are related to the Islamic religion and social norm. Then the students lowest claim (0%) of disagree for topic cloning of extinct animal and cloning of animal for Qurbani purposes. From the data show that the students giving the claim of disagreeing for the topics which are related to the Islamic religion and social norm. It means the consistency of students argumentation are influenced by religion and social norm basically. Each argument has a purpose, namely to establish a claim (conclusion or thesis). A claim is a disputed/debatable statement - a rhetorical idea (namely a speaker or writer) asks another person to accept. Or it is also called as a debatable statement. A claim expresses a specific position to a controversial and dubious problem, the claimant certainly wants the audience to accept the claim [15]. Cultural understanding in science is explained by Timothy Lenoir [16] Lenoir argues that knowledge is the result of interpretation in which knowledge objects and observers do not stand apart from each other. Interpretation activities are cultural practices that involve cognitive and social factors that have implications for one another. These two factors are always attached to the actors of knowledge production (scientist). With the understanding of science as a cultural practice, Lenoir tells that knowledge is always local, partial, and based on interests.

3.2. The consistency of argumentation reason for high school students

Figure 3 shows the consistency of students argumentation reasons for each topic. The students' reasons are classified become five reasons there are; religion (R), ethics or social (E/S), medical (M), subjective (S), and scientific (Sc). First topic, about cloning on extinct animals, 142 students or 83.5% write the scientific reasons, 25 students or 14.7 % write subjective reasons, 0 student or 0% write medical reasons, 1 student or 0.6 % write ethics or social reasons, and 2 students or 1.2% write
religion reasons. Second topic, about cloning on animals for Qurban purposes, 98 students or 57.6\% write the religion reasons, 38 students or 22.4\% write scientific reasons, 23 students or 13.5\% write subjective reasons, 8 students or 4.7\% write medical reasons, 3 students or 1.8\% write ethics or social reasons. Third topic, about cloning on human, 68 students or 40\% write the religious reasons, 59 students or 34.7\% write the ethics or social reasons, 16 students or 9.4\% write the medical and scientific reasons and 11 students or 6.5\% write the subjective reasons.

Figure 3. Consistency of students argumentation reasons for each topic

The data show that the reason for students argumentation depends on the issue of each cloning topic. For the cloning on extinct animals, the students' reasons are scientific reasons approximately 83.5\%, it showed that the students write reasons about scientific related to cloning on the extinct animal, e.a conservation. For the cloning on animals for Qurban purposes, 57.6\% write the religious reasons, e.a the Islamic law about cloning for Qurban purposes. For the cloning for human, 40\% students write religious reasons, e.a the origin of human as God's creation.

This data are supported by Rogof [12] believes that argumentation activities are part of a social process to develop scientific discourse in learning science. Argumentation is also an important tool for teaching critical thinking [13] thus, critical thinking skills are very essential in socializing today, especially in a sociocultural perspective. The argument is often recognized as both a process and as a product. It is a verbal, social, and rational activity that can be co-constructed dialogically or constructed rhetorically in written or spoken language [17].

For the issue of topic I, many students answered agreeing to clone extinct animals, this is in accordance with the purpose of complete conservation tracing the Law of the Republic of Indonesia concerning Conservation of Biological Resources and their Ecosystems that conservation of living natural resources is the management of natural resources biodiversity whose utilization is carried out wisely to ensure the continuity of its supply while maintaining and improving the quality of its diversity and value.

For the issue of topic II, cloning for sacrificial animals, this raises the controversy in the version of student claims, which according to Islamic law, the problem of sacrificial animals must meet the criteria [18] such as; 1) sacrificed animals are generally farmed animals such as camels, cows, and goats, both ordinary sheep or goats. 2) has reached the age of the Shari'ah in the form of jaza'ah (half year old) of sheep or tsaniyyah (full year old) ) 3) free of physical disability (disability) such as; a) clear / visible blindness b) clear pain c) clear limping d) very thin, has no bone marrow, and other defects that can be likened to the physical defects above, such as blind eyes, both hands and feet broken or paralyzed and others. (Points 2 and 3 have the potential to be violated if cloned for sacrified animals).

For the issue of topic III, cloning in humans also raises the controversy in the claim version, based on [19] that cloning in humans raises several things from the point of view: 1) Aspects of marriage law and inheritance law, related to the bias of marriage, 2) Aspects of health law, the use of stem cells of any kind is unethical to reproduce cloning, and therapeutic cloning is permitted as long as in its
implementation it respects the right to life of the embryo. Life must be respected since the beginning of fertilization of egg and sperm cells, for that reason it is not permissible to use stem cells derived from embryonic stem cells, but can use adult stem cells so as not to cause ethical problems 3) Legal aspects of human rights, the use of stem cells of any kind is unethical for reproductive cloning because it is considered to dictate new individuals by previous individuals so as to disrupt human rights 4) Aspects of criminal law, relating to persecution, abortion, and assistance in abortion.

3.3. The pattern of argumentation reason for each high school
The first school is a middle level of a private high school (MPv), secondary school is a lower level of a public high school (LPu) and the third school is a middle level of a public high school (MPu). Figure 4 shows the pattern of argumentation reason for the MPv. Figure 4 shows the pattern of the reason for the first topic is 80% for scientific reasons, the second topic is 43.48% for religious reasons. The third topic are 36.96% for ethics and social norm.

![Figure 4. The pattern of argumentation reasons for MPv](image)

Figure 5, shows the pattern of argumentation reasons for LPu, for the first topic, is 88.24% for scientific reasons. The second topic is 57.35% for religious reasons. The third topic is 54.41% for religious reasons.

![Figure 5. The pattern of argumentation reasons for LPu](image)

Figure 6, shows the pattern of argumentation reasons for MPu, for the first topic is 80.36% for scientific reasons. The second topic is 69.64% for religious reasons. The third topic is 33.93% for ethics and social norm.
The pattern of argumentation reasons for MPu

The pattern shows a similarity of reason between the MPv and MPu. These schools show similarity pattern of the reason for all topics, topic I is scientific reasons, topic II is religious reasons, and topic III is ethics or social reasons. Then the LPu show the different one, for topic III, is religious reasons. Further research is needed to look at the types of school levels and arguments consistency with socio-cultural of students in schools.

4. Conclusion

The consistency of argument consists of claims and reasons itself. The result shows the pattern of agreeing and disagree about cloning in 3 topics: I) extinct animals, II) animal for Qurban purposes, III) humans. The higher consistency showed disagree in topics II & III and consistency of reason for each topic are I) science 83.5%, II) religion 57.6% and III) religion 40%. This provides that, consistency of students argumentation on cloning issue is influenced by science, religion, and social norms. It needs to be investigated further to uncover the relationship of arguments consistency with socio-cultural of students in schools.

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