



Informal Reasoning Profile (IR) Students of SMA Negeri 1 Toroh, Grobongan District, Central Java Province

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ABSTRACT

Informal Reasoning (IR) is reasoning that is individual. Informal reasoning can be trained by providing questions based on socio-scientific issues. This study aims to determine the profile of Informal Reasoning (IR) students of class XI MIPA SMA Negeri 1 Toroh. The research subjects totaled 216 students. The sampling technique for this research is Proportionate Stratified Random Sampling. The method used is a survey via the Google Informal Reasoning (IR) test form in the form of multiple choice questions and descriptions, as well as supporting data in the form of teacher and student interview sheets and school observation sheets. The results showed that SMA Negeri 1 Toroh was categorized as 'good' with an average score of 73.8. The average percentage score for the 'good' category, namely 78.24%, was obtained because students' answers in responding to an issue could consider the risks and benefits as well as the emotional response to those related to the issue. The 'very good' category obtained a percentage of 15.74% because the students' answers in responding to social issues were already logical and used scientific language for various considerations of either sustainable losses or benefits. As for the category 'good enough' to get a percentage of 6.02%, it is known that students' answers respond to a social issue by considering a sense of concern. The results of mastery of each Informal Reasoning (IR) pattern are rational patterns with the highest acquisition of 46% then emotive patterns of 29%, while intuitive patterns with a percentage of 25%. Based on the research that has been carried out, it is concluded that the Informal Reasoning (IR) abilities of SMA Negeri 1 Toroh students are influenced by several factors including teacher competence, cognitive knowledge, regional demographics and infrastructure.

Keywords: *Emotive, Informal, Reasoning*

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INTRODUCTION

The development of the 21st century world requires students to be able to compete with other students, without being stuck in the country's geographical barriers (Chen dkk., 2019; Li dkk., 2020; Wongpun & Guha, 2020). The 21st century is also characterized by very rapid technological developments. The success of a student depends on the fulfillment of 21st century skills so that students must learn to own them. According to

NEA (2002) there are four aspects of 21st Century Skills that students must master, namely: critical thinking, problem solving, communication and collaboration (Juhanda dkk., 2019; Varghese & A, 2021). These skills are the benchmark for learning at various levels of education.

Efforts to develop and improve the quality of human resources can be achieved by learning science. According to Sudarisman (2015) science learning has a sizable contribution to technological development, this is because science is the basic science that underlies technology development. Rustam (2011) states that one of the keys to success so that students are able to adapt to changes that occur in their environment is through the development of science, especially biology (Maass dkk., 2019; Reilly dkk., 2019; Toropova dkk., 2021). Having a good understanding of the nature of learning and the characteristics of biology material will help the successful implementation of the 2013 Curriculum.

The 2013 curriculum learning is one of the policies that have been implemented by the Government in improving the quality of education in Indonesia (Freeman dkk., 2019; Mystakidis dkk., 2022; Tang dkk., 2020). The 2013 curriculum learning is based on a concept that learning is a process of developing the potential and character building of each learner as a result of the synergy between education that takes place in schools, families and communities. The 2013 curriculum is a new policy in the field of education that includes science learning. Learning science in the 2013 Curriculum is learning designed in such a way that students can actively construct concepts, laws or principles through the 5M stages including: observing, asking, trying, reasoning, and communicating. (Ministry of Education and Culture, 2013). In addition, the government also conducts evaluations internationally, for example TIMSS (Trends in International Mathematics and Science Study) and nationally, for example the national exam.

TIMSS (Trends International Mathematics and Science Study) is an international study of trends or developments in mathematics and science. This study was organized by the International Association for The Evaluation of Education Achievement (IEA), which is an international association for assessing achievement in education based at the Lynch School of Education, Boston College, USA. TIMSS aims to find out the increase in mathematics and science learning which is held every four years. TIMSS survey results on Indonesian education for four periods show that the ability of Indonesian students is at the lowest level (Broer dkk., 2019; Chomphuphra dkk., 2019; Mejía-Rodríguez dkk., 2021). Starting in 1999 Indonesian students were ranked 34th out of 38 countries, in 2003 they were ranked 35th out of 46 countries, in 2007 they were ranked 36th out of 49 countries and in 2011 they were ranked 38th out of 42 participating countries. Whereas in 2015 TIMSS was only attended by students of class VI who had never attended before. As a result, Indonesian students ranked 44th out of 49 participating countries.

Another effort made by the government to determine the ability level of students is through the national exam. Data on the average results of the Toroh 1 Public High School national exam in 2018 ranked 4th out of 11 schools in Grobogan Regency. As for science exams, especially biology, SMA Negeri 1 Toroh was ranked 5th out of 11 schools in

Grobogan Regency with an average of 55.07. In 2019 the results of the national exam for SMA Negeri 1 Toroh experienced an increase in rank, namely 4 out of 11 public high schools in Grobogan Regency, but the average score decreased, namely 54.27 (Puspendik, Kemendikbud.go.id).

It can be seen from the data from the TIMMS evaluation results that scientific achievement, especially in biology lessons, students' level of reasoning is still low. According to Wardhanui and Rumiati (2011) one of the causes of low student reasoning is that Indonesian students are generally less trained in solving questions with characteristics such as the questions on TIMMS whose substance is contextual, reasoning, argumentation and creativity in solving problems (He dkk., 2019; Laengle dkk., 2021; Ma & Torre, 2020). In addition, based on the average national exam score, it can be seen that the biology subject at SMA N 1 Toroh has decreased. This does not rule out the possibility that the students' level of reasoning in solving national exam questions is also low, because the national exam questions cover the cognitive domain, which includes reasoning or reasoning.

Sadiq (2004) states that reasoning is a thought process to draw conclusions or make a new statement that is true based on several statements whose truth has been proven before. Meanwhile Suriasuantri (2007) stated that reasoning is a thought process in drawing conclusions in the form of knowledge (Gabriela dkk., 2022; Kartel dkk., 2022; Qureshi dkk., 2022). Reasoning is a process of logical thinking, means using a certain logic and is analytical in nature which is a consequence of a certain mindset, namely the study of premises and their relationships to obtain conclusions based on the logic used. Sumpter (2009) adds reasoning as a line of thought adopted to produce statements and reach conclusions in solving tasks.

Meanwhile Topcu et.al. (2011) argues that the results of science can be presented in the language of formal reasoning and logic, but the results of thinking themselves come from informal reasoning. Individuals who engage in informal reasoning will contemplate causes and effects, pros and cons and alternatives in addressing these social issues (Dewi S dkk., 2022; Keshav dkk., 2022). Informal reasoning is recognized as a rational process of constructing and evaluating arguments (Wu & Tsai, 2007). Informal reasoning is considered important when information is less accessible, or when issues are more open, debatable, complex and structured. Informal reasoning is individual, meaning that each individual in thinking about something must use the reasons that underlie these thoughts differently (Sadler & Zeidler, 2005).

Socio-scientific issues are ideal as reasons for applying informal reasoning, because by definition socio-scientific problems are complex, open, controversial, and have no definite answers. As stated by Venville & Dawson (2010) that the application of socio-scientific issues has become important in science education because it occupies a central role in the process of scientific literacy (Anoum dkk., 2022; Demina dkk., 2022; Hikmah dkk., 2022). Reinforced by the opinion of Acar et.al. (2010) that socio-scientific issues are a good context to see the quality of students' argumentation skills because in the context of

socio-scientific issues can contain more than one scientific concept to explain the same phenomenon.

Even though living in an era with rapid science and technology development, in reality learning in schools is rarely associated with socio-scientific issues as material for training to be able to reason in solving a problem (Firman dkk., 2022; Ilham dkk., 2022; Safitri dkk., 2022). Even though in its application science is packaged in many social circles as an issue that reaps controversy. How can society develop in this modern era if people are not trained to be able to solve various problems that are closely related to everyday life which cannot be separated from the role of technology and science. Based on the description of the problems that have been described, an initial study is needed to explore this and see the profile of students' informal reasoning. This informal reasoning research was conducted on high school students because informal reasoning at the high school level was still low. So this study aims to look at the Informal Reasoning (IR) profile of students of SMA Negeri 1 Toroh, Grobongan Regency, Central Java Province in terms of content on socio-scientific issues.

RESEARCH METHODOLOGY

The research was conducted at SMA Negeri 1 Toroh, Grobongan Regency, Central Java Province. The sample in this study was students of class XI MIPA SMA N 1 Toroh, totaling 216 students. Sampling was taken by means of Proportionate Stratified Random Sampling, which is a technique used when members/elements are not homogeneous and proportionally stratified. The research instrument used was a sheet of test questions on the Google form, observation sheets and interview sheets.

RESULT AND DISCUSSION

The research was conducted at SMA Negeri 1 Toroh in class XI, namely XI MIPA 1, XI MIPA 2, XI MIPA 3, XI MIPA 4, XI MIPA 5, and XI MIPA 6. The research data were in the form of answers from informal reasoning tests with test instruments on Google forms in the form of multiple choice questions and descriptions, as well as non-test data as supporting data such as school observation sheets, teacher interview sheets, and student interview sheets. The results of the study provide an overview of the informal reasoning abilities of Toroh 1 Public High School students which are described as follows:

Data on Research Results Average Value of Informal Reasoning (IR) Ability of Class XI MIPA Students of SMA N 1 Toroh

Based on the interval category of informal reasoning abilities, the average percentage of informal reasoning ability scores of SMA Negeri 1 Toroh as a whole is 78.24%. This shows that the informal reasoning abilities of Toroh 1 Public High School students fall into the 'good' category according to Table 4.1

Table 4.1 Percentage of Average Value of Informal Reasoning Ability

Category	Interval	Frequency	Persentase (%)
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Very good	81-100	34	15,74
Good	61-80	169	78,24
Pretty good	41-60	13	6,02
Not enough	21-40	0	0
Very	<21	0	0
Not enough		216	100

The frequency of the good category was 169 students, that is, the whole class from class XI MIPA 1 to class XI MIPA 6. The less and very less categories had a frequency of 0 meaning that out of 6 classes no students scored less than 21 to 40.

Based on the categories determined on the informal reasoning test, the entire sample of class XI MIPA SMA Negeri 1 Toroh has a different average score. The following is data on the average value of informal reasoning skills obtained by each class XI MIPA of SMA Negeri 1 Toroh, which is presented in Table 4.2

Table 4.2 Results of Average Value of Informal Reasoning (IR) Ability in Each Class Sample

Code School	Amount Sample	Average Value	Categori
MIPA A	36	71,06	Good
MIPA B	36	74,23	Good
MIPA C	36	74,69	Good
MIPA D	36	73,30	Good
MIPA E	36	76,39	Good
MIPA F	36	73,15	Good
Rata-rata		73,8	Good

Research Data Based on Patterns of Informal Reasoning Ability (IR) Students in Each Class

Summary of research data from 12 multiple choice questions regarding the informal reasoning abilities of class XI MIPA students of SMA Negeri 1 Toroh based on informal reasoning patterns (intuitive, emotive, and rational) can be seen in Table 4.3

Table 4.3 Percentage of Students' Informal Reasoning (IR) Pattern Ability in Each Class

Code School	Informal Reasoning (IR) Pattern Frequency			Persentase Pola Informal Reasoning (IR)		
	Intuitif	Emotif	Rasional	Intuitif (%)	Emotif (%)	Rasional (%)
MIPA	125	125	182	28,94	28,94	42,12

A						
MIPA	102	130	200	23,61	30,09	46,30
B						
MIPA	98	130	204	22,69	30,09	47,22
C						
MIPA	106	134	192	24,54	31,02	44,44
D						
MIPA	90	126	216	20,83	29,17	50
E						
MIPA	116	116	200	26,85	26,85	46,3
F						
		Rata-rata		25	29	46

Based on Table 4.3, it is known that the percentage of informal reasoning skills in the intuitive pattern has the highest percentage, namely MIPA A with an acquisition of 28.94%. While the lowest percentage of intuitive patterns is MIPA E with a gain of 20.83%. This shows that in class XI MIPA A the pattern of thinking changes more slowly than class XI MIPA E. Because intuitive patterns are the most common informal reasoning found in elementary school students. In class XI MIPA E it is known that there has been a change from an intuitive pattern to a rational pattern because at the high school level students tend to use their rational reasoning, which is based on logic (Hartini dkk., 2022; Najeed dkk., 2022; Nopiana dkk., 2022). This is in accordance with Kuhn (2004) stating that early childhood is not in a position to develop full awareness in the coordination between claims and evidence. Meanwhile, students in junior and senior high schools have achieved more advanced cognitive development that allows them to think and behave in formal and abstract operations.

The emotive pattern that has the highest percentage is in MIPA D class with an acquisition of 31.02%. Meanwhile, the one with the lowest percentage was MIPA F class with an acquisition of 26.85%. The results of this study indicate that MIPA D class is more likely to apply a caring attitude towards others in solving problems.

In the rational pattern, which has the highest percentage, namely MIPA E class, which is 50%. Meanwhile, the lowest percentage was in MIPA A class, which was 42.12%. This shows that class XI MIPA E in solving problems tends to have logical considerations with regard to sustainable impacts.

Overall Data on Research Ability on Informal Reasoning (IR) Patterns of Class XI MIPA Students of SMA Negeri 1 Toroh

Informal Reasoning (IR) or informal reasoning has 3 patterns which include intuitive, emotive, and rational. Intuitive patterns usually appear based on spontaneous feelings, both positive and negative. The emotive pattern has the characteristic of caring for others and the last is a rational pattern that is able to consider various kinds of problems. Informal reasoning abilities of students in each pattern of each class show different achievement results. The following is the percentage of informal reasoning

abilities for all students of class XI MIPA at SMA Negeri 1 Toroh in each pattern presented in Table 4.4.

Table 4.4 Percentage of Overall Informal Reasoning (IR) Ability of Class XI MIPA Students of SMA Negeri 1 Toroh in Each Pattern of Informal Reasoning (IR).

Pola Informal Reasoning (IR)	Frekuensi	Persentase (%)
Intuitive	637	25
emotive	761	29
Rational	1194	46
Total	2592	100

Based on the results of research on the mastery of informal reasoning patterns, overall Toroh 1 Public High School students achieved the highest percentage, namely patterns.

rational with a percentage of 46%. While the lowest pattern mastery is the intuitive pattern with a percentage of 25%. The emotive pattern has a percentage of 29% which can be seen in Table 4.4.

Rational pattern

In the overall rational pattern, SMA Negeri 1 Toroh students obtained a percentage of 46% who answered rationally from 12 questions on the informal reasoning ability test. Sadler & Zeidler (2005) explains the description of a rational pattern, namely if the answers are relatively logical, using scientific understanding and language, considering the risks and benefits, as well as the disadvantages and advantages. These results indicate that students are able to work on informal reasoning questions in the context of Socio Scientific Issue (SSI) according to student development.

Based on the stages of cognitive development, Piaget in Slavin (2011) said that the last stage of cognitive development is formal thinking operations. This stage begins to be experienced by children at the age of 11 years and continues into adulthood. The characteristic of this stage is the acquisition of the ability to think abstractly, reason logically, and draw conclusions from the available information. The abstract quality of formal operational thinking is evident in verbal problem solving. In addition to having abstraction skills, formal operations thinkers also have the ability to idealize and imagine possibilities. Someone is able to deal with hypothetical problems. He understands and can use the possibilities that exist. Able to solve more complex problems that require reasoning and logic. Children at the formal operational stage are already able to reason using abstract things and use logic.

Judging from the 12 questions on the informal reasoning ability test which consisted of 3 themes, namely HIV-AIDS questions 1-5, cloning on questions 6-8, and Genetically Modified Organism (GMO) questions 9-12. Students mostly answered rationally on question number 1 which can be presented as follows:

-
1. Seorang wanita terinfeksi HIV/AIDS, sebuah penyakit fatal yang menyerang system kekebalan tubuh manusia. Dia sekarang kesakitan dan harus hidup sendiri karena tidak ada yang mau berinteraksi dengannya. Orang takut apabila dekat dengan dia akan terinfeksi virus tersebut. Apakah Saudara setuju dengan orang-orang yang menghindari interaksi dengannya? Jelaskan pendapat Saudara mengenai hal tersebut!
- Tidak, saya tidak setuju karena manusia diajarkan untuk saling menghargai orang lain apapun itu keadaannya.
 - Tidak, saya tidak setuju karena dia juga manusia tidak pantasnya seperti itu dan kita perlu mengasihi.
 - Tidak, saya tidak setuju karena virus HIV/AIDS dapat menular bukan melalui kontak fisik wajar melainkan kontak tertentu.

Figure 4.11 Informal Reasoning Questions on the Theme of HIV-AIDS

The problem in Figure 4.11 is a question on the theme of HIV-AIDS which is presented in the case of a woman infected with HIV-AIDS. People are afraid to interact with these women. Students are expected to be able to identify controversies in people infected with HIV-AIDS and choose statements rationally and logically.

Based on the frequency of rational pattern answers out of 12 informal reasoning questions, question number 1 has the highest frequency of rational pattern answers, namely 181 out of 216 students. It is known that before the researcher gave these informal reasoning questions the students already knew the facts in the field and gained cognitive knowledge first when learning in class. The following is an example of students' rational answers in option c for the statement whether you agree with people avoiding interaction with people who are infected with HIV-AIDS. 'No, I do not agree because the HIV-AIDS virus can be transmitted not through physical contact but through certain contacts'

Emotive pattern

The overall results of SMA Negeri 1 Toroh students who answered emotive patterns out of 12 questions obtained a percentage of 29%. This gain is the second rank percentage after the rational pattern. According to Sadler & Zeidler (2004) emotive patterns tend to be expressions that consider ethical values or social values. Emotive way of thinking shows moral emotions in the form of sympathy and empathy (Dianovi dkk., 2022; Rohmalimna dkk., 2022). Emotive reasoning will emerge when students choose to make decisions by using their feelings of sympathy and empathy. Decisions taken are also influenced by the attitude of caring for others. Obtaining the lowest percentage of emotive patterns indicates that students lack character education. Character education can be obtained from socioscientific issue strategies.

Based on the frequency of emotive patterns of the 12 questions on the informal reasoning ability test, question number 3 had the highest frequency of answers, namely 163 out of 216 students. The following is an excerpt of question number 3 on the informal reasoning test:

-
3. Menurut Saudara apakah situasi permasalahan HIV/AIDS di Indonesia mudah dipecahkan?
- a. Tidak, permasalahan ini tidak mudah dipecahkan karena salah satu penyebabnya adalah penyebaran obat ARV yang kurang merata di daerah-daerah.
 - b. Tidak, hal ini tidak dapat dipecahkan dengan mudah. Kita tunggu dan berdoa saja supaya Allah yang menegur dengan segala kehendak-Nya.
 - c. Tidak, hal ini tidak mudah dipecahkan karena banyak orang yang kurang peduli dan acuh tak acuh kepada penderita HIV/AIDS, sehingga penderita merasa terdiskriminasi.

Figure 4.12 Informal Reasoning Questions on the Theme of HIV-AIDS

The questions in Figure 4.12 are questions with the theme of HIV-AIDS. Opinions are presented regarding the situation with the HIV-AIDS problem in Jepara, which are easy to solve or not, as well as opinions related to this fact. Students are expected to be able to analyze the problem and choose a statement according to their opinion. Most of the students answered option c which shows an emotive pattern. Option c explains that the HIV-AIDS problem in Jepara is not easy to solve, because many people do not care about and are indifferent to people with HIV-AIDS, so sufferers feel discriminated against. Students' sympathy and empathy emerged when they thought that the HIV-AIDS problem in Jepara was not easy to solve. Those infected with HIV-AIDS feel discriminated against because they receive unequal treatment in their own environment.

Intuitive pattern

In the intuitive pattern as a whole students of SMA Negeri 1 Toroh get a percentage of 25%. This percentage is obtained from the results of students' answers to the 12 questions on the informal reasoning test given. According to Sadler & Zeidler (2005) intuitive patterns are reasoning with hunch answers, direct responses (spontaneity), are personal, often precede rational or emotional, always leave the results to God and make decisions without considering anything.

Surya (2003) states that intuitive patterns are included in the pre-operational stage of cognitive development according to Piaget's theory. Intuitive reasoning occurs in children aged 4-7 years. At this age children have shown cognitive activity in dealing with various things outside themselves. His thinking activity does not yet have an organized system. Children are able to understand the reality in the environment by using signs and symbols. But the way children think at this age is not systematic, inconsistent, and illogical. Intuitive thinking is direct perception of the outside world but without prior reasoning. His thinking is one way where the child can only see from one point of view. If several ideas are combined, the child's thinking becomes chaotic. Intuitive reasoning can be concluded that occurs in elementary school students, reasoning that appears in junior high school students is rational reasoning, and informal reasoning that occurs in high school students is emotive and rational reasoning.

Following is the frequency of intuitive pattern answers from the 12 questions on the informal reasoning test, item number 4 has the highest frequency of intuitive pattern answers, namely 186 out of 216 students. The following is an excerpt of question number 4 on the informal reasoning test:

-
4. Bagaimana pendapat Saudara apabila pencegahan penularan HIV/AIDS dilakukan dengan cara membagikan kondom secara gratis?
- a. Menurut saya, pembagian kondom secara gratis akan memicu perilaku seks bebas yang seolah-olah secara resmi dilegalkan.
 - b. Menurut saya, pembagian kondom secara gratis akan menolong orang-orang yang tidak terinfeksi HIV/AIDS.
 - c. Menurut saya, hal tersebut dapat meningkatkan betapa pentingnya perlindungan ketika berhubungan seks guna mengurangi resiko terinfeksi HIV/AIDS.

Figure 4.13 Informal Reasoning Questions on the Theme of HIV-AIDS

The questions in Figure 4.13 are questions with the theme of HIV-AIDS. Opinions are presented related to preventing the transmission of HIV-AIDS by distributing free condoms. Students are expected to be able to analyze these problems and choose statements according to their opinions. Students mostly answer option a which is an intuitive pattern. The response given was a spontaneous response that only focused on the cause of HIV-AIDS transmission, namely free sex. In fact, the transmission of HIV-AIDS is not only caused by free sex, there is a possibility that a legal married couple may be infected with the HIV-AIDS virus because other factors such as the use of used syringes puts a person at very high risk of contracting it, therefore option c is the rational answer. considering the risks as well as the advantages and disadvantages provided.

Based on the results of this analysis, it can be concluded that the average informal reasoning of Toroh 1 Public High School students is in the 'good' category with the highest percentage in the rational pattern. This is supported by the research of Sadler & Zeidler (2005) which states that a person can develop several combinations of reasoning, both intuitive and emotive, emotive and rationalistic, as well as rationalistic and intuitive (Amado-Alonso dkk., 2019; Rahmah dkk., 2022). Meanwhile, based on the development of Piaget's theory, adolescents aged 11 and over are included in the fourth stage, namely formal operations. At this stage the child is able to think abstractly and more logically. They can solve problems encountered with reasoning and logic.

Data from Teacher and Student Interview Results at SMA Negeri 1 Toroh

Based on the interview sheets that have been determined to support informal reasoning research data for Toroh 1 Public High School students, the result is that each student has various answers, but there are several questions that have the same answers. The results of these interviews are supporting data in research. The following are the results of interviews with teachers and a sample of class XI MIPA students at SMA Negeri 1 Toroh.

Results of teacher interviews

Based on interviews that were conducted with SMA Negeri 1 Toroh teachers, it was found that the teacher already knew about Informal Reasoning (IR). The teacher has given reasoning-based questions, namely by associating the problems that exist around the toroh.

Results of student interviews

Based on interviews that have been conducted with several students, various results have been obtained. Where some students said they had gotten reasoning questions and some other students said they only got theory-based or rote-based questions. This shows

that the internal factors of students also affect students' reasoning abilities. Internal factors themselves include student concentration in learning, students' cognitive knowledge and student background.

CONCLUSION

Based on the results of the research that has been done, it can be concluded that the students of SMA Negeri 1 Toroh are included in the good category, where the average score of the six classes is 73.8. This shows that SMA Negeri 1 Toroh students have used their rationale to respond to an event even though the percentage is still relatively low, namely 46%. Cognitive knowledge greatly influences the results of students' reasoning achievement. It can be proven through interviews that have been conducted with students and teachers. The teacher has given questions on the theory of memorization and reasoning, the teacher has also raised current issues with the aim of training students to think and find solutions to these events. Regional demographics are also very influential where Toroh is a sub-district in which there are many villages. There are Toroh 1 Public High School students who live in urban and rural areas. The average city dominance is stronger in rational reasoning. This is because in cities it is faster to access information than in villages.

Based on the results of the research and discussion regarding the Informal Reasoning (IR) skills of SMA Negeri 1 Toroh students, the suggestions that can be submitted are: The biology learning process should emphasize students' reasoning activities, so that students begin to be trained and accustomed to reasoning and thinking logically, not just arguing based on an emotional or intuitive perspective. Teacher knowledge about informal reasoning and the importance of reasoning is needed to facilitate the learning process, as well as to make it easier for teachers to analyze students' informal reasoning abilities. The biology learning process requires teachers to use the Socio Scientific Issue (SSI) approach as an effort to shape students' character to survive in facing various social problems and issues in society so that they do not only rely on their emotions and intuition, but based on their scientific knowledge. Further research is needed to develop this research because this research only provides informal reasoning test questions which are then analyzed to find out the informal reasoning patterns of Toroh 1 Public High School students. perfect.

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