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Article

**Analysis of Student's Rational Thinking Ability in A Career Perspective  
in The Field of Science, Technology, Engineering, and Mathematics  
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**ABSTRACT**

The ability to think rationally is the ability that a person has based on real events so that he is able to solve problems with a reasonable mindset that can be accepted by reason. The STEM approach is an approach that combines four fields of science, namely Science, Technology, Engineering, and Mathematics which is interesting to apply in science learning, which is able to provide experience and lead to career fields. This study aims to determine the students' rational thinking skills towards the career perspective of the STEM field. The research method used is a qualitative method with the type or design of naturalistic research. Data were collected by observation, documentation and in-depth interviews (In Depth Interview) which were conducted on 7 selected informants. The data that has been obtained is then analyzed using the Miles & Huberman model which consists of three stages, namely 1) Data Reduction 2) Data Presentation 3) And Drawing Conclusions, research analysis is assisted by Nvivo12 Software for the coding process to determine the category of rational thinking skills and answers that according to the interview. Based on the results of data analysis shows that students have a tendency to be creative in processing a product with the ability to imagine and the ability to imagine that applies the ability to imagine and imagine. Students have a tendency to have a career in the fields of Science, Engineering and Technology so that students have the desire to have a career in the biotechnoplaner field.

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**INTRODUCTION**

Science subjects are subjects that study the universe so that science subjects are studied from elementary school to college. Science subjects themselves consist of 3 fields of science, namely biology, physics, and chemistry, each of which can provide different information and knowledge so that science learning does not only teach theoretical aspects but the real conditions of an environment (Susanto et al., 2019). The development of science and curriculum changes are one of the reasons for the need for a change in the learning system. The development of science as it is today will require institutions to produce graduates who

are competent in their expertise and capable in thinking.(Fuadah & Fatmahanik, 2022) One of the thinking skills that must be possessed to meet these graduate standards and as an effort to meet the demands of the 21st century is the ability to think rationally. The development of the ability to think rationally is also supported by the development of the world of education which is inseparable from the process of thinking, with increasing technological developments students are required to have skills in thinking so they can develop knowledge, so that this ability to think rationally can be applied in problem solving activities in real life as well as problems in learning activities.(Awalin & Ismono, 2021)

Science learning as it is today is more developed with the demands of the 21st century where in the 21st century, science learning must be linked to various fields of science, namely *Science, Technology, Engineering, and Mathematics*, which is commonly referred to as STEM, because the 21st century makes more use of technology and technology. information that will later be integrated into everyday life (Anggraini & Huzaifah, 2017)of course, through learning that emphasizes the technological aspect, science learning is also able to improve the quality of students both in terms of knowledge and skills.

Science lessons are also subjects that can provide experiences for students to understand themselves and the natural environment around them in developmental aspects that can be applied in everyday life.(Ganessa, 2013, n. (Trianto, 2007)) In science learning activities the activities which is shown to be more directed to the experience given to students to understand the natural surroundings scientifically and develop competence in addition to some scientific experts also revealed that science lessons are able to direct the characteristics of science literate students so that science activities involving student activities will create a new generation that is able to think logically and rationally that will be able to face the challenges of life in the 21st century.

One of the skills needed in science learning is thinking skills. As is the case in biology subjects that emphasize students to have the ability to group, memorize, remember, classify, etc., from some of these abilities into a single unit to direct students in rational thinking so that the emphasis given to science learning mainly lies in rational thinking skills, thinking skills. can lead to the development of students to understand the problems they face and find out how to solve them.(Hendrayana, 2017, n. Yuliariatiningsih & Irianto, 2009)

The industrial revolution 4.0 of course also cannot be separated from technological developments, in addition to the need for rational thinking skills, students' views on technology are needed. As currently learning science has been combined with several approaches, one of which is the STEM (*Science, Technology, Engineering, And Mathematics*) approach, this approach is an approach that combines four disciplines that are able to become one of the abilities of students. Based on the description above, students must have the ability to think rationally as a capital in determining their future careers based on their views on STEM (*Science, Technology, Engineering, And Mathematics*) because STEM itself will provide experience for students.(Sundari et al., 2021)

Based on the results of initial observations, the researchers found the uniqueness of the research site, namely by showing the ability to think rationally which includes the ability to classify, imagine and imagine. One of the science teachers at the research site has gradually introduced the STEM approach to learning. As in the material classification of living things by studying bacteria. From this learning, students are able to classify bacteria based on their benefits, from these activities students have shown the ability to think rationally. In addition, these bacteria can also be used as a product where the processing cannot be separated from STEM techniques which are also able to direct students to have a career in the field.

Based on this assumption, the researcher will analyze students' rational thinking skills in a career perspective in the STEM field at a school in Ponorogo Regency. Through this research activity, it is hoped that researchers will be able to determine students' rational

thinking skills in their view towards careers in the STEM field so that later they can improve the quality of science education so as to create graduates who are capable of thinking and proficient in (*Science, Technology, Engineering, And Mathematics*) and can meet the demands of industrial revolution 4.0.

## METHODS

The research method used is qualitative research. Qualitative research according to Sugiyono qualitative research method is a research method used to examine an object naturally based on the philosophy of postpositivism. is naturalistic which examines a phenomenon from various realities and interactions that have occurred in human life. While the type of research used is a type of phenomenological or naturalistic research which is a research activity to reveal the meaning of a phenomenon that occurs naturally. So that in this qualitative research it will reveal the original situation that occurred in the school where the researcher conducted the research which later produced data for further analysis.

The subjects in the research that will be carried out are science teachers and class VII B students at Mts Muhammadiyah 3 Yanggong, the researchers took the subject of science teachers. Meanwhile, the researcher took the subject of class VII B because class VII B was one of the classes that still had a fairly good level of rational thinking ability by having the ability to classify, imagine, and imagine so that it needs to be investigated more deeply so that later it can be seen how the ability to think rationally. grade VII B students on their perspectives in the STEM field. The research will be conducted at Mts Muhammadiyah 3 Yanggong which is located in Kec. Jenangan Kab. Ponorogo.

Sampling criteria were carried out through observation activities that had been carried out previously. Through observation, researchers can find out the potential respondents/samples to be used as research subjects, so that researchers choose science teachers and class VII B students as research respondents. Determination of the student sample through a test activity consisting of 20 multiple choice questions based on real life then the researcher took 7 students with 4 students having the highest scores and 3 students with moderate scores which would then be used as samples for interview respondents. The following table presents the criteria for grouping students based on test scores from the highest, medium and low.

**Table 1.** Criteria for Grouping Students Based on Test Scores from The Highest, Medium and Low

| Skor (S)                              | Kelompok |
|---------------------------------------|----------|
| $S \geq (\bar{x} + DS)$               | Tinggi   |
| $(\bar{x} - DS) < s < (\bar{x} + DS)$ | Sedang   |
| $S \leq (\bar{x} - DS)$               | Rendah   |

Information :

s = student score

x = average student score

DS= standard deviation

- The high group is students who have a score greater than or equal to the average score plus the standard deviation
- The medium group is students who have a score of more than the average minus the standard deviation or a score less than the average plus the standard deviation.
- The low group is students who have a score of more than the average minus the standard deviation.

Based on the student scores that have been calculated using the standard deviation formula, there are 4 students in the high score category and 3 students in the medium score category. The 4 students were selected as respondents/interview samples and 3 students were selected as respondents/sample with moderate scores who are also active students and have

good speaking and discussion skills, even though the scores from the test are not in the high category.

Sources of data in the form of primary data and secondary data, primary data obtained from the interview process to research subjects consisting of 7 students and 1 teacher, the teacher was used by researchers to obtain accurate data so as to strengthen the data and synchronize the results of interviews with 7 students. While secondary data was obtained from several trusted journals to compare and make references from the data that has been obtained by researchers.

The procedure for collecting data in this study was through interviews with each research subject.

#### 1. Interview

The type of interview used was unstructured interviews where the researcher would ask a number of unstructured questions to the science teacher at Mts Muhammadiyah 3 Yanggong and also 7 students who had been selected based on certain criteria to obtain the required data.

#### 2. Observation

This observation is carried out using the five senses in order to obtain the information needed to answer the research problem. This observation aims to get a real picture and also answer research questions. The selected observations are individual observations where observations are made by research authors on an issue raised as an object of research.

#### 3. Documentation

Was carried out by taking photos of observation and interview activities conducted with informants at Mts Muhammadiyah 3 Yanggong. The function of this data is used to dig up information that is happening at Mts Muhammadiyah 3 Yanggong

In the research conducted, the researcher analyzed data using the Miles & Huberman model which consisted of three stages, namely 1) Data Reduction 2) Data Presentation 3) And Drawing Conclusions. (Sugiyono, 2019) the analysis in this study was assisted by Nvivo12 Software for the coding process. so that the researcher is able to know the category of rational thinking ability and the appropriate answer in the interview. The following is an explanation of each analytical model from the Miles & Huberman model

##### 1. Data Reduction (Data Reduction)

The first stage is data reduction, at this stage the researcher creates code in the Nvivo12 Software. Then the data is reduced based on the theme and entered into the Nvivo12 Software. This reduction activity aims to sort out answers from interviews that are in accordance with the themes created, by carrying out data reduction activities it will make it easier for researchers to analyze data.

##### 2. Data Display (Data Display)

Data from the interviews were then presented in the form of transcripts containing questions and answers between the informants and researchers. Then the transcript data is entered in the Nvivo12 application and the researcher makes a node from the theme that the researcher has created. Then the transcript of each interview that corresponds to the nodes in the coding (grouping) based on the category of answers that match the theme. Then after the coding process is complete, the next step is making a category map of the problems and patterns of answers from informants using a project map. From the results of the project map, researchers can find out the categories of answers from informants that match the theme.

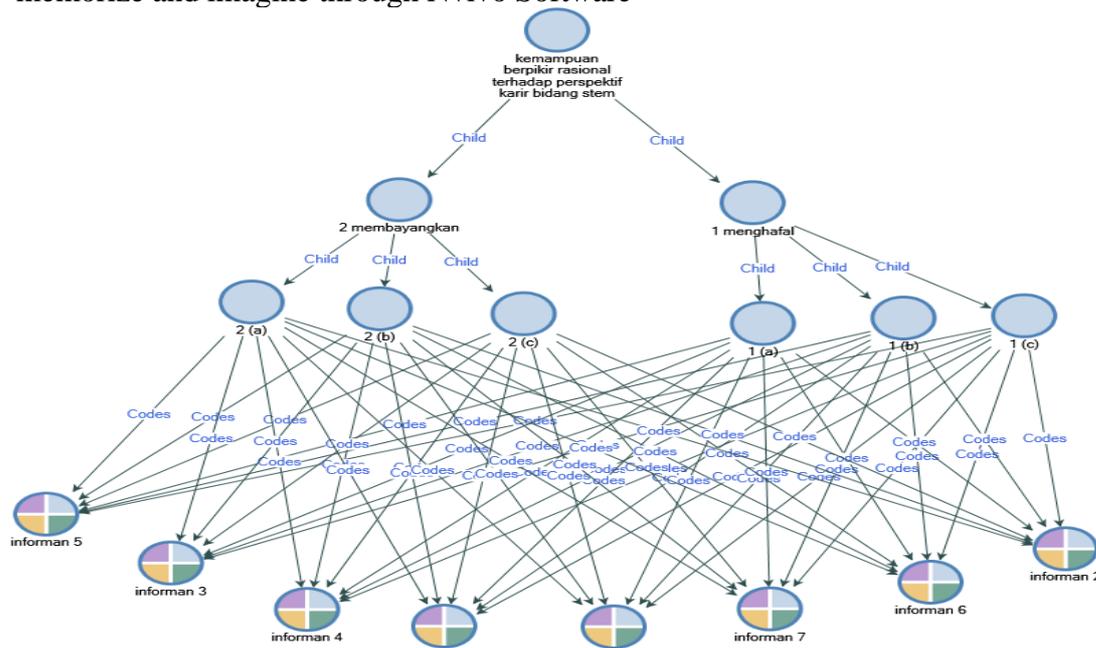
### 3. Drawing Conclusion

The next step is drawing conclusions by drawing conclusions based on data that has been analyzed using the Nvivo12 application. Drawing this conclusion can make it easier for researchers to understand the results of data from research which are then explained specifically in the discussion chapter.

## RESULTS AND DISCUSSION

### 1. The ability to memorize and imagine with STEM career matches with learning, STEM career matches with student interests and STEM career matches with student skills.

Presented in the following image which is an analysis of the results of coding the ability to memorize and imagine through Nvivo Software



**Figure 1.** The Results of Coding The Ability to Memorize and Imagine

Based on Figure 1, the ability to think rationally towards a career perspective in the STEM field, on this memorization indicator all informants answered the questions the researcher asked correctly. They answered that in their learning activities they must do memorization activities. Of course, at the time of product manufacturing activities, students must memorize the ingredients in the manufacture of these products, which reveals that memorizing activities can make it easier for students to learn something. This was shown by the informant who said, **Informant**: “Yes. He was told to memorize the ingredients to make it easier to make products”. Then the informant also revealed that in memorizing the informant also has a view to developing a product that is made to be a better product so that the informant is able to have a view on a career in one of the STEM fields and of course the informant also thinks that the career that will be taken later is based on interests and their expertise. This is shown by the informant saying, **Informant I**: “Usually I only remember his work and then sometimes I think of his work to be developed, but it's only a shadow.” Not only that, memorizing activities are also able to grow the interest and desire of students in a career, this is shown by the informant who said **Informant II**: “Yes, later when I grow up I will definitely have a career with my interests.”

Based on this statement, it can be said that the ability to memorize is able to grow the ability of students to think and determine their careers. By showing student statements which reveal that in memorization learning activities are also applied by students to make it easier to

carry out an experiment and in thinking skills, students can show their ability to imagine and imagine their careers through memorization activities.

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Then on the imagining indicator which is an ability that many students already have, this ability must be applied in learning activities. To have the ability to think rationally, of course, students must have the ability to imagine. In the results of interviews, informants or students have applied the ability to imagine this in learning activities, because in learning to imagine something will foster the imagination and creativity of students in their work. One of them is in the following interview excerpt where students reveal that they always do imagining activities, especially in learning activities. **Informant** : *“Usually biology lessons make me have a view on the work that I will take later.”* From the quote from one of the informants, it shows that learning biology is able to grow the imagination of students through imagining activities where biology itself is a subject that how to apply it through practical activities. In other words, this can improve the ability to imagine students so that they are able to imagine for a career.

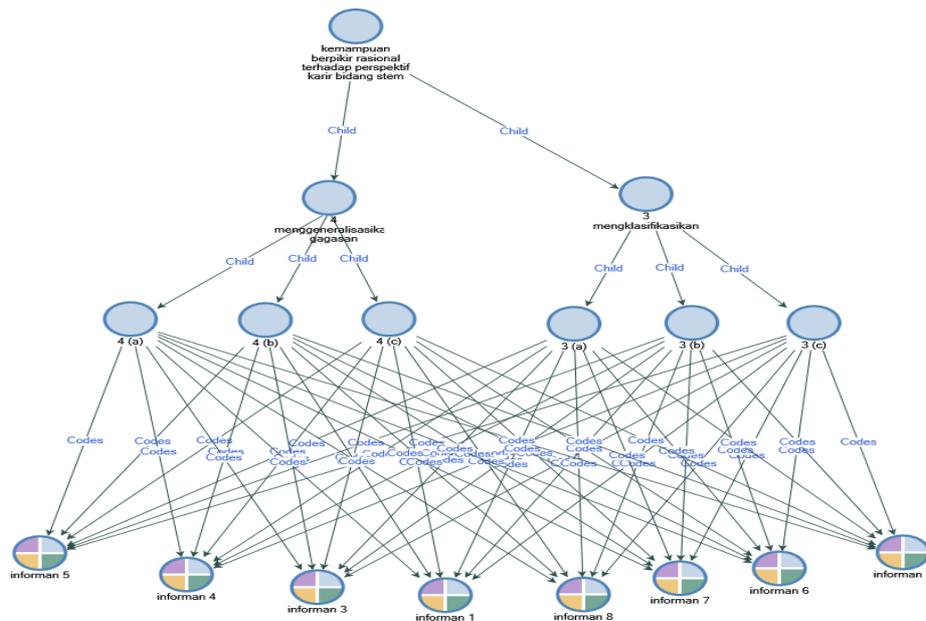
Learners as informants also revealed that they imagined their careers according to their interests and what they liked. Because the bottom line during a career of course must be adjusted to the expertise of each individual. STEM itself provides information to students so that they can make a career among the four STEM fields. Researchers know that students have an interest in careers in the STEM field through student statements as follows **Informant I**: *“Have little idea about STEM because the job I want to dream of is still related to STEM”* **Informant II**: *“Tempe is my daily food, usually I imagine for a career in technology.”* **Informant III** : *“Yes, there is a shadow and want to develop the product so that many people are interested in it”*

Statements from informants I, II and II can be said that in learning activities they are able to direct students in careers, by linking the learning through imagining activities. So that in imagining activities, students are able to develop something based on their thoughts and imagination into a work made based on their interests and expertise. Based on the statement above and supported by data that has been analyzed using the help of Nvivo 12 Software, it shows that all informants have applied the ability to imagine both in learning activities and even shadows about career views in the STEM field. Informants give the impression that if they are faced with a product, the product will be developed according to the interests and expertise of each of the students.

Thus, from the analysis of the two indicators, it can be said that the ability to memorize and imagine can direct students in a career through learning activities. which is when students do not have interest in a career, memorizing and imagining activities can measure the sharpness of students in processing their imagination for a career in the field that students are interested in.

## **2. The ability to classify and generalize with the suitability of the STEM career with learning, the match of the STEM career with student interests and the match of the STEM career with student expertise.**

Presented in the following image which is an analysis of the results of coding the ability to classify and generalize through Nvivo Software



**Figure 2.** Ability to Classify and Generalize

Based on Figure 2 shows that all informants have done and have the ability to analyze a thing. Of course, in science learning activities, students will definitely be faced with material that is required to classify something based on its benefits or functions. For example, in questions posed to researchers to informants. **Informant I:** *When studying monera I was also asked by the teacher to classify based on the benefits of the monera.*

Based on the statement above, the researcher took an example of the classification of creatures, in that material they were faced with the benefits of monera or bacteria in daily life, but these bacteria also have drawbacks, namely they can cause several diseases. One of the informants revealed that in the material for classifying living things, students or informants must classify these modes, the classification activity is able to direct and hone students' thinking patterns to have rational thinking skills. Then the activity of classifying can also provide students' views on a career in the stem field where the informant said, **Informant II:** *Yes, I learned a little about classifying, usually I choose the one I like the most from the four fields of science and what I am interested in about the technology because it is more interesting if it is developed.*

From The informant's statement shows that for a career in the STEM field, students or as informants will first classify STEM based on the interests of students. From this statement, it can be said that the activity of classifying must be closely related to learning activities because many science subjects teach students to classify. The purpose of the classification activity is to find out the differences that exist in something to be studied. There the students revealed that *"yes a little learn to classify, usually I choose what I like the most from the four fields of science and what I am interested in about the technology because it is more interesting if it is developed"* this shows that classifying activities are very important to determine something, there students have an interest in a career in technology from the four STEM fields that have been described. So it can be concluded that classifying activities are able to direct students in determining their careers.

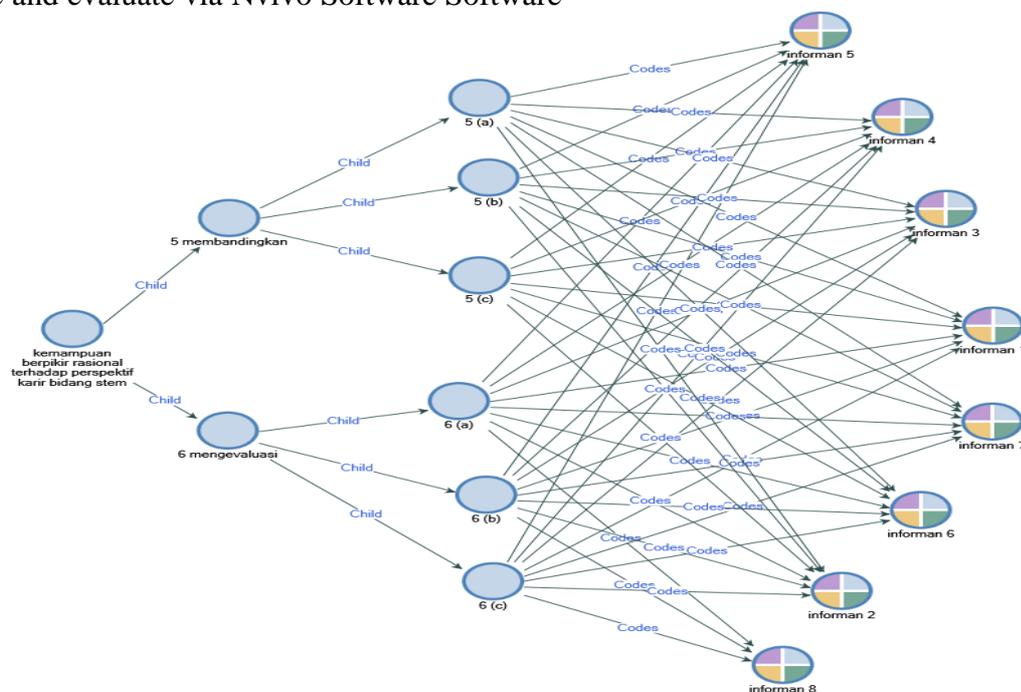
Then the generalizing indicator is the ability to make ideas for the introduction of an event. By having the ability to generalize, it is expected that students will have the ability to think rationally. The data obtained from interview activities show that students always have ideas in their work because for students having ideas is the main key in creating an interesting work. Of course, learning activities cannot be separated from practical activities that are able to direct students to participate in learning. Learning activities that involve this

practice are revealed by students to be able to grow ideas in a career, where the informant said, informant I: *when I grow up I want to work with interests and talents that I like, if STEM I choose engineering*. The researcher also gave examples of soy sauce products and the informant said that the second informant: *if I prefer soy sauce to be developed into bacem tempe or tofu because almost everyone likes it*.

In the conversation above shows that students are able to have an idea even for their careers they already have ideas, students also revealed that *"I prefer soy sauce to be developed into bacem tempe or tofu because almost everyone likes it"* from the sentence shows that participants Students have an idea to develop a product so that it can attract many people. From this it shows that students actually already have ideas to work in the STEM field because indirectly making soy sauce through the biotechnology and biotechnology stages itself cannot be separated from STEM.

### 3. Ability to compare and evaluate the suitability of STEM careers with learning, match STEM careers with student interests and match STEM careers with student skills.

Presented in the following image which is an analysis of the coding results ability to compare and evaluate via Nvivo Software Software



**Figure 3.** Ability to Compare and Evaluate

Based on Figure 3 of some of the indicators that have been described above, the comparing indicator is the indicator most often used by students in learning activities or in determining something. From the results of the interviews, it is shown by a chart that has analyzed the data from the interviews showing that students have done several comparing activities. As in the following quote which shows that students as informants will compare careers that are in accordance with the interests of students. Informant I: *Yes, obviously I will compare, I will adjust according to my expertise and interest in the STEM field*. Informant II: *Yes, I will definitely compare the two products so I can choose according to my interests*. From the conversation above, it shows that learning activities cannot be separated from comparing activities, from conversations between researchers and informants providing information that students will first compare something that is an option so that students are able to make the right decisions and in accordance with their respective interests and expertise. -each student. So it can be said that the comparison activity is able to give students the ability to choose something to determine a career in the future.

Then indicators evaluate, evaluating activities are also very important activities in learning because evaluation is an improvement activity to make things better in the future. In determining a career, students also need to know the things that are considered to be the best, therefore learning activities that involve a STEM approach must of course have evaluation activities so that later students are able to choose a career that suits their interests from the four fields of science that exist in the field. STEM. One of the results of the interview shows that evaluation activities need to be in particular learning.

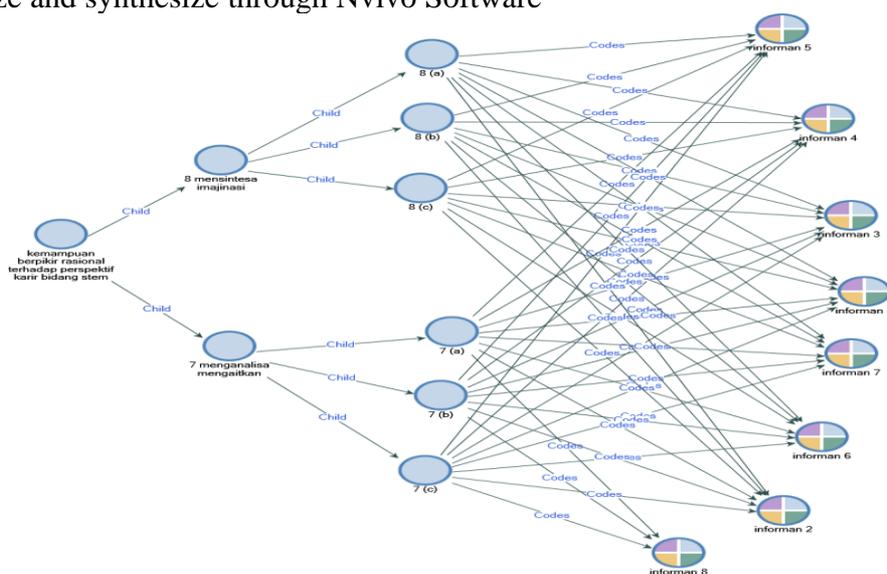
**Informant :** *I think you need it to be better in the future.* The statement was expressed by the informant that evaluation activities need to be carried out.

Informants also revealed that evaluation activities need to be carried out by students in determining careers in the STEM field. Students need to carry out these evaluations which aim to find out which one is better than the four fields of knowledge in STEM so that evaluation activities are able to grow students' evaluation abilities. This was reinforced by the informant who said that informant I: *every learning there must be an evaluation, I think STEM can grow the ability to evaluate Ms.* informant II: *I think evaluation can be used to improve my skills, Ms.*

From the results of the interviews above, it shows that evaluation needs to be done for future improvements. Students who are also informants revealed that STEM is able to grow students' evaluation abilities and according to students this evaluation is able to improve students' skills so that later students are able to choose fields that are in accordance with the interests and expertise of each student. Because in choosing a STEM career, you must really pay attention because STEM itself has four fields of science so that if you want a career in it, students must choose the one that suits their interests. However, there were also informants who said that evaluation was not necessary in learning because they might not really understand the activities and functions of the evaluation. Thus, it can be said that evaluation is able to facilitate students in determining careers that match their interests in the STEM field

**4. Ability to analyze and synthesize with STEM career compatibility with learning, STEM career compatibility with student interests and STEM career compatibility with student skills.**

Presented in the following image which is an analysis of the results of coding the ability to analyze and synthesize through Nvivo Software



**Figure 4.** Ability to Analyze and Synthesize

Based on Figure 4, analyzing is the ability to relate something that is related to one another. In science subjects, it is inseparable from linking activities so that analyzing activities

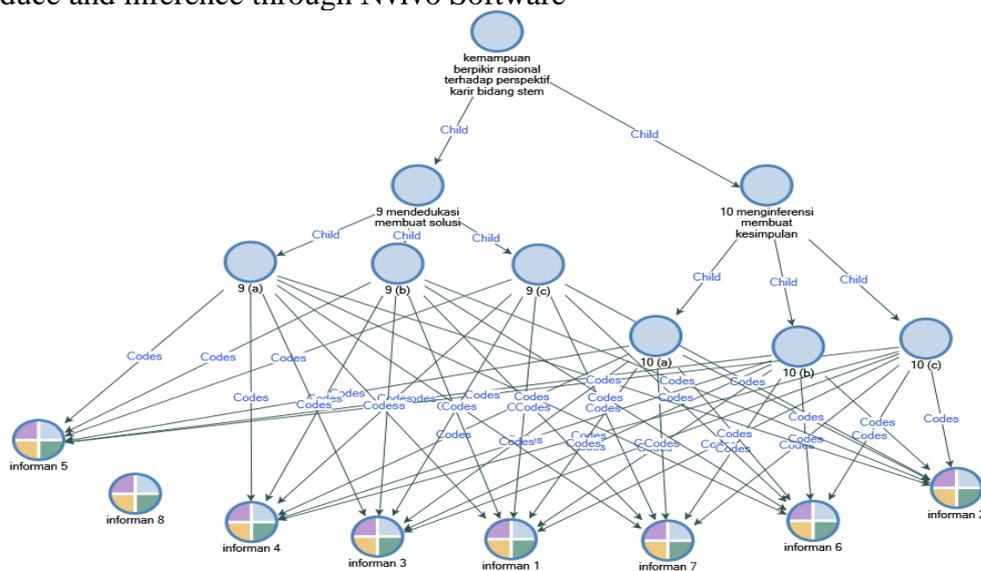
are very suitable to be applied in science learning. the data obtained from the analysis indicators were answered from the information provided by the informants because according to the informants themselves, analyzing or linking activities were always applied in science learning. This is shown from the following conversation.

**Informant I:** *Your biology lessons are usually STEM-related, but I don't really have the vision for a career in the field. But I'm interested in engineering .* **Informant II:** *I like your technique, if you're making tempeh, my expertise is in the technique of making it.* The researcher also gave an example of the relationship between STEM and everyday life because informants I and II showed an interest in STEM in the technical field, and the informant said **Informant III:** *I think propellers can be related to everyday life, from there I am interested in a career in propeller manufacturing engineering.* From the data above, the informant gave an answer that biology subjects are usually associated with STEM, there the informant also revealed that the STEM field of interest is the technical field because the technique itself is inseparable in everyday life. Thus it can be said that the ability to relate is able to foster student interest in a career. In addition, linking activities can also be used as a reference for researchers so that students can think scientifically in depth.

Then on the indicator of synthesis which is the ability to think imaginatively to be creative. in a career in the STEM field of course also requires the ability to imagine. In the interview activities the researchers tried to explore how deep they were able to imagine with their own thoughts. stem itself provides experience for students who are able to apply it in life, in making stem-based products will produce works that can be developed From the results of the interview above regarding the ability to imagine, it turns out that so far students have always imagined in everything. Students or informants reveal that STEM is able to grow the imagination of students because like the answer of informant II that STEM cannot be separated from the process of making products such as bread and donuts that can be linked to stems so that when making STEM-based works, students will first imagine according to what is in the minds of students. Thus it can be said that students can determine and imagine a career through imagining activities

### 5. The ability to deduce and infer the fit of STEM careers with learning, match STEM careers with student interests and match STEM careers with studentskills

Presented in the following image which is an analysis of the results of coding the ability to deduce and inference through Nvivo Software



**Figure 5.** Ability to Deduce and Inference

Based on Figure 5, the results of the analysis above show that almost all informants have the ability to deduce which is a skill involving several components that have been described, for example, involving identifying, synthesizing, classifying so that one can obtain solutions for problem solving. here researchers need data to find out whether students are able to have problem solving skills because to have the ability to think rationally students must be able to have the ability to think rational skills in making solutions. The data was obtained from in-depth interviews with students. **Informant I:** *I think STEM can provide a solution* **Informant II:** *Usually if there is a problem, the solution I get is definitely based on my thoughts* **Ms. Informant III:** *Of the four STEM fields I prefer the engineering field. If it's suitable, I'm usually more proficient in making solutions.* statements from informants I, II and III show that students can be said to be able to make solutions.

From the results of these interviews indicate that in learning activities where there is a problem students are able to find the solution. The solution informant's opinion is able to come from the students' own thoughts based on what they understand and if they want to have a career in the STEM field, students are more interested in the technical field so that students say that if they are already interested in that field then if they are faced with problems, students will definitely easily find the solution. Thus the ability to make solutions can foster higher-order thinking skills for students. This high-level ability can be used by students in determining careers. (Wahono et al., 2020)

Then the inference indicator is the ability to combine all skills to draw a conclusion or the ability to make conclusions. The ability to make conclusions, of course, must also be quasi students to have the ability to think rationally. If students have the ability to think rationally, they will be able to provide views on careers in the stem field. In order to obtain information about students' inference-making abilities, the following interview was conducted, **Informant I:** *I think STEM can enable me to draw conclusions, Ms.* Then whether in making these conclusions according to the skills of students and informants said **Informant II:** *Usually the conclusions I make are based on the truth and my expertise, Ms.* ideas of students to be developed into careers. shown by the informant saying, **Informant III:** *If I prefer collaboration, sis, because it is more interesting, so later on in my career, maybe I will make a collaboration.*

From the results of the interviews above, it was obtained data that in learning activities that involve STEM are able to grow the ability of students to draw conclusions and conclusions made by students based on the skills of the students themselves because of course each individual has different thoughts so that in making definite conclusions from the participants. One student and another student varies according to their respective understanding and expertise. Thus, researchers can say that the high-level ability of students can be determined in the ability to make conclusions so that the ability to make conclusions is able to direct students in determining careers and have high-level abilities.

### **Students' Rational Thinking Ability to Career Perspectives in the STEM Field**

From the results of the analysis above, it can be seen that the ability to think rationally must be owned by every student, of course, not only as a student's capital for a career in the STEM field according to each student's expertise but also to shape students as millennials who are ready to navigate the century. -21. Not only to navigate the 21st century but Yulianingsih also revealed that thinking skills can lead to the development of students to understand the problems they face and find out how to solve them.

One of the skills that students must have is rational thinking skills. Students' rational thinking abilities in view of STEM careers have also been shown by students with their interest in the technology used by teachers to attract and develop students' thinking patterns towards learning activities. Not only that, but students also show interest in a career in the

technical field because according to students, practical activities or techniques of making something can develop students' imaginative abilities.(Khoiri, 2019)

The teacher also revealed that in the activity of making something students were able to show their creativity so that in this case it could be seen that students had an interest in the technical field. In learning activities by applying science learning which focuses more on activities in the real world and the natural surroundings, it will gradually train students' growing thinking patterns, which include thinking before taking action, looking for strong evidence so that they can conclude and develop thinking skills. imagination. (Ganesha, 2013) From the description it shows that from the analytical activities that have been carried out by researchers, students are able to show their ability to find solutions so that the description strengthens researchers to conclude that students at Mts Muhammadiyah 3 Yanggong are able to have rational thinking skills.

Students views on careers in the STEM field have also been shown rationally, this is evidenced by the expression that students will classify, imagine, imagine, even make decisions or make conclusions for a career in the STEM field. Although students themselves are not maximal in their views on careers, students are able to imagine and imagine views on careers. The ability of students to make these decisions requires critical thinking so that it directs the ability to think rationally. (Ariza Rahmadana Hidayati et al., 2021) With the ability of students who are able to imagine, classify, imagine and even make solutions, it shows that students have rational thinking skills. research conducted by Edi Irawan and Adilah Endah Putriyani, 2021, Journal of Science and Science Education Research, Vol 07, No 02, With the Title Analysis of Rational Thinking Ability in *Asynchronous* Online Learning With a STEM Approach. From the results of the study it was explained that the ability to think rationally was needed, especially in learning science, it was needed as an effort to solve the problems they faced and the ability to think rationally that combined with The STEM approach is able to make students think more rationally in addressing problems. (Dina et al., 2021) It is also shown that in the STEM approach, one of the activities shown by students is forming a group to build skills and knowledge as a design for students to identify and solve problems. (Nugroho & Nurcahyo, 2018)

Thus, it can be concluded that students' rational thinking skills towards a career perspective in the STEM field have shown good rational thinking skills because students have been able to show interest in one of the STEM fields consisting of (*Science, Technology, Engineering, And Mathematics*). Research conducted by Nugroho shows that STEM education with rational thinking skills is if STEM education is applied in learning it will have an impact on students' rational thinking patterns in determining their views on future careers. So it can be seen that rational thinking is also closely related to STEM for future careers.

## CONCLUSION

From the results of this study, conclusions can be drawn that have benefits for insight for readers, thus the following conclusions are drawn from the results of the study. The ability to think rationally is needed to make it easier to determine a career in the STEM field. Students have a tendency to be creative in processing a product based on the ability to imagine and the ability to imagine. By applying the ability to imagine and imagine and even be able to evaluate and draw conclusions, students have a view of careers in the STEM field. Students have a tendency to have a career in the fields of Science, Engineering and Technology so that students have the desire to have a career in the biotechnoplaner field.

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