

PAPER • OPEN ACCESS

Analysis of Critical Thinking Skills Based on Learning Motivation, Responsibility, and Physics Learning Discipline of Senior High School Students in Takalar

To cite this article: Dewanthikumala *et al* 2021 *J. Phys.: Conf. Ser.* **1805** 012004

View the [article online](#) for updates and enhancements.

You may also like

- [Identification of critical thinking: suku \(supik and kulub\) on electricity material in Jambi Province](#)
D Hendriyani, P Siahaan and A Samsudin
- [The relationship between critical thinking skills and students learning motivation with students' learning achievement about buffer solution in eleventh grade science program](#)
Rizqiyah Nur'azizah, Budi Utami and Budi Hastuti
- [The analysis of the implementation of scientific approach 5M to improve the elementary students' critical thinking skills in solving a fraction sorting problem](#)
Rofika, Dafik and T D Prastiti



Connect with decision-makers at ECS

Accelerate sales with ECS exhibits, sponsorships, and advertising!

▶ Learn more and engage at the 244th ECS Meeting!

Analysis of Critical Thinking Skills Based on Learning Motivation, Responsibility, and Physics Learning Discipline of Senior High School Students in Takalar

Dewanthikumala*, Jasruddin, and H Abdullah

Program Studi Pendidikan Fisika, Program Pascasarjana Universitas Negeri Makassar

*Email: dewanthikumala1212040007@gmail.com

Abstract. This study is a correlational research, which aims to (1) describe learning motivation, responsibility, learning discipline, and critical thinking skills in physics, (2) analyze the correlation between learning motivation and critical thinking skills in physics, (3) analyze the correlation between responsibility and critical thinking skills in physics, and (4) analyze the correlation between learning discipline and critical thinking skills in physics. The research variables were learning motivation, responsibility, and learning discipline as the independent variables; whereas, critical thinking skills in physics was the dependent variable. The subjects of the study were all students in grade XI IPA at senior high school students in Takalar regency of academic year 2019/2020 with 288 students. Data collection techniques in the study were collected through questionnaires and multiple choice tests. Analysis of the data used in the study used theoretical and empirical data analysis where the hypothesis was determined through three predictor regression analysis. Based on the result of statistics descriptive analysis, it is obtained that learning motivation, responsibility, learning discipline, and critical thinking skills of students in physics are in moderate category. Whereas, the results of hypothesis test analysis indicate that there is a positive and significant correlation between learning motivation and critical thinking skills in physics; responsibility and critical thinking skills in physics; learning discipline and critical thinking skills in physics; learning motivation, responsibility, learning discipline, and critical thinking skills in physics.

1. Introduction

Education is one of the basic needs for humans. With the education he gets, humans prepare themselves to live their lives. The challenge of education today is being able to produce individuals who are able to compete in the era of the 21st century. It is known that 21st century learning has the main principle that learning must be student-centered who is collaborative, contextual, and integrated with society. Mulyasa [1] the role of teachers in implementing 21st century learning is very important in realizing a better future for the nation's children. Currently, various information can be accessed freely via the internet and there is no guarantee that the news that is seen is true. The explosion of information from various sources may be outdated, incomplete, or not credible. To be able to use this information properly, individuals must evaluate data and information sources. The ability to evaluate and subsequently decide to use correct information requires critical thinking skills. This is in line with Permendikbud No 81A 2013 concerning curriculum implementation which states that the future competency needs of students are needed, namely the ability to communicate, be creative, and think critically.



When an individual has the ability to think critically, the individual does not just believe in the facts around him without proof and tries to prove that the information is truly valid and can be accounted for. Critical thinking skills are very important to be developed and taught in every subject, because critical thinking skills are not innate and do not develop naturally. For this reason, one of the people responsible for developing and teaching Kabupaten Takalar is the teacher. This is intended so that every learning that is carried out always pays attention to the critical thinking skills of students [2].

Fitria *et al* [3] physics is one of the subjects in the science family at the formal education level which is considered to play a very important role. As for the consideration that physics is considered important to be taught as a separate subject, it can be seen in Permendiknas No. 22 2006, namely: (1) In addition to providing knowledge to students, physics subjects are intended as a vehicle for developing thinking skills that are useful for solving problems in everyday life; and (2) physics subjects need to be taught for a more specific purpose, namely to equip students with the knowledge, understanding, and a number of abilities required to enter higher education levels and develop science and technology. Permendikbud Number 37 of 2018 concerning Core Competencies and Basic Competencies in the 2013 Basic and Secondary Education Curriculum shows that the percentage analysis of critical thinking skills in physics for class X is 63.64 %, class XI is 58.33 %, and class XII is 72.73 %.

Based on the results of preliminary observations made by researchers on August 26, 2019 in several schools in Takalar regency, it shows that the Minimum Completeness of Learning for each school is above average, the teacher has implemented the 2013 curriculum, and it is also seen that technological sophistication increasingly mushrooming among students now. Departing from this situation, it should be noted that the efforts made by the teacher will be meaningless if students as learning subjects do not involve themselves or do not play an active role in the teaching and learning process. In this connection, it is necessary to study the variables related to the critical thinking skills of students in terms of the involvement and role of students in the teaching and learning process [4].

Tawil and Liliasari [5] the involvement and participation of students in the physics learning process can be in the form of a strong willingness to learn, courage, persistence, high curiosity, most of which lead to the ability of students to manage their own attitudes and discipline. This is also in line with the implementation of the 2013 curriculum in every school that emphasizes activity-based learning, so the assessment emphasizes more on the assessment of the process both in the aspects of attitudes, knowledge, and skills. It can be said that critical thinking skills are closely related to learning motivation, responsibility, and learning discipline that students have. Motivation to learn is the overall driving force in students that causes learning activities, which ensures the continuity of learning activities and provides direction for learning activities, so that the desired activities are achieved. Students who have high learning motivation make it possible to obtain high learning outcomes as well, meaning that the higher the motivation, the more intense the effort and efforts made, the higher the ability to think critically. Likewise, with the responsibility and learning discipline that students have. Responsibility is an obligation that needs to be carried out and applied in everyday life in order to achieve peace, tranquility and discipline towards actions and deeds. For example, students in class XI IPA of senior high school students in Takalar regency have entered adolescence. So, as stated by Myers in Desmita [6] that "when their cognitive abilities reach maturity, most adolescents begin to think about what is expected and criticize their society, their parents, and even their lack of self. themselves".

Abdurrahman [7] the activity of conducting self-criticism reflects that class XI students should be able to organize themselves, choose what is good and what is bad for themselves and must be responsible for what has been done. If someone already has an attitude of responsibility for what he does, then that person also has a disciplined attitude. Discipline, generally referred to as order, is used to describe a situation where rules are made by some external party such as teachers, and enforced by others if necessary with sanctions such as punishment.

2. Method

The type of research used is *ex post facto* research, where according to Sugiyono [8] this research is a tracing study of an event or an event that has occurred and then traces back to find out the factors that

can cause the incident. This study aims to investigate the relationship between independent variables, namely learning motivation, responsibility, and learning discipline with critical thinking skills as dependent variables without any treatment applied. The design of the relationship between these variables in this study is described in Figure 1.

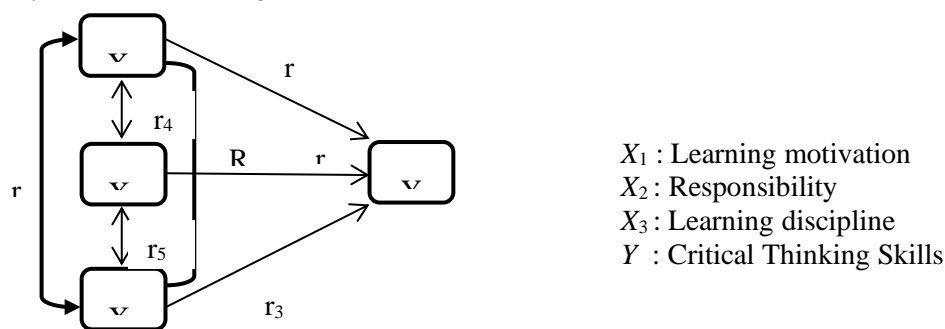


Figure 1. Path Analysis

3. Results and Discussion

3.1. Results of Descriptive Statistical Analysis on Critical Thinking Ability of Students in Class XI IPA Senior High School Students in Takalar Regency

The average score of critical thinking skills of students in class XI IPA of state senior high schools in Takalar regency was 21.67. Where the score achieved by students was 8 and the achievement achieved by students was 34 with a sample size of 288 students. The standard deviation obtained is 6.91 and the variance is 47.72. The percentage of the acquisition of scores per category of critical thinking skills in physics of class XI IPA students can be seen in Table 1.

Table 1. Data Percentage of Acquisition Score Per-Category Critical Thinking Ability in Physics of Class XI IPA Students of Senior High Schools in Takalar Regency

Score Interval	Category Ability to Think Critical Physics	Number of Students (f)	Percentage (%)
$Y > 32$	Very Good	11	3.82
$25 < Y \leq 32$	Good	93	32.29
$18 < Y \leq 25$	Enough	87	30.21
$11 < Y \leq 18$	Less	72	25.00
$Y \leq 11$	Very Less	25	8.68
Total		288	100

Source: Primary data processed (2020)

The category of the percentage of critical thinking skills in physics of students of class XI IPA at senior high schools in Takalar regency shows that the largest data frequency is in the good category with a percentage of 32.29 %, while the smallest data frequency is in the very good category with a percentage of 3.82 %. Elliot *et al* [9] the characteristics of respondents in this study are heterogeneous when viewed from the cognitive and psychological aspects of students themselves. Respondents are in the adolescent phase, the phase where a teenager experiences emotional development. Most adolescents begin to think about what to expect and make various efforts to solve the problems they face. The critical thinking skills of students' physics are influenced by several factors. One of them is learning motivation, responsibility, and learning discipline. These three factors have a sufficient relationship with students' critical thinking skills in physics. Apart from these three variables, there are many factors that can influence students' critical thinking skills in physics.

3.2. Results of Descriptive Statistical Analysis of the Physics Learning Motivation of Students in Class XI IPA Senior High Schools in Takalar Regency

The average score of students' physics learning motivation in class XI IPA senior high schools in Takalar regency was 202. Where the lowest score achieved by students was 108 and the highest score achieved by students was 268 with a sample size of 288 students. The standard deviation obtained is 30.27 and the variance is 916.57. The percentage of the acquisition of scores per category of students' physics learning motivation class XI IPA can be seen in Table 2.

Table 2. Data Percentage of Score Acquisition by Category of Students' Physics Learning Motivation Class XI IPA Senior High School in Kabupaten Takalar

Score Interval	Category Motivation to Learn Physics	Number of Students (<i>f</i>)	Percentage (%)
$X_1 > 247$	Very Good	15	5.21
$217 < X_1 \leq 247$	Good	78	27.08
$187 < X_1 \leq 217$	Enough	119	41.32
$157 < X_1 \leq 187$	Less	58	20.14
$X_1 \leq 157$	Very Less	18	6.25
Total		288	100

Source: Primary data processed (2020)

The percentage category of physics learning motivation for students of class XI IPA at senior high schools in Takalar regency shows that the largest data frequency is in the sufficient category with a percentage of 41.32 % while the smallest data frequency is in the very good category with a percentage of 5.21 %. Tu'u [10] this means that the motivation to learn physics is sufficient to have an influence on the critical thinking skills of students' physics. Students who have high learning motivation will always be enthusiastic and have high ambition, do the best possible tasks assigned to them, learn faster and have better thinking skills as well.

3.3. Results of the Descriptive Statistical Analysis of the Responsibilities of Learning Physics for Class XI IPA Students of Senior High Schools in Takalar Regency

The average score of the students' physics learning responsibility in class XI IPA of senior high schools in Takalar regency was 182.56. Where the lowest score achieved by students was 106 and the highest score achieved by students was 249 with a total sample of 288 students. The standard deviation obtained is 25.08 and the variance is 629.14. The percentage of the acquisition of scores per category of responsibility for learning physics of class XI IPA students can be seen in Table 3.

Table 3. Data Percentage of Acquisition Score Per-Category Responsibility for Learning Physics for Class XI IPA Senior High Schools in Takalar Regency

Score Interval	Category Learning Responsibilities	Number of Students (<i>f</i>)	Percentage (%)
$X_2 > 220$	Very Good	15	5.21
$195 < X_2 \leq 220$	Good	80	27.78
$170 < X_2 \leq 195$	Enough	108	37.50
$145 < X_2 \leq 170$	Less	69	23.96
$X_2 \leq 145$	Very Less	16	5.56
Total		288	100

Source: Primary data processed (2020)

The percentage category of the responsibility for learning physics of class XI IPA students at senior high schools in Takalar regency shows that the largest data frequency is in the enough category with a percentage of 37.50 % while the smallest data frequency is in the very good category with a percentage

of 5.21 %. Responsibility is closely related to the ability to think critically because students' learning responsibilities are awareness, courage, and obligations that each student has in learning. A person who is based on responsibility, then he can increase the development of his potential through learning in accordance with the hopes and desires of himself and the environment [11].

3.4. Results of Descriptive Statistical Analysis of the Discipline of Physics Learning for Class XI IPA Students of Senior High Schools in Takalar Regency

Based on the data obtained from the physics learning discipline questionnaire distributed to 288 respondents, the percentage of the acquisition of scores per category of physics learning discipline for students of class XI IPA senior high schools in Takalar regency can be seen in Table 4.

Table 4. Data on Percentage of Score Acquisition by Category of Physics Learning Discipline for Class XI IPA Senior High Schools in Takalar Regency

Score Interval	Category Physics Learning Discipline	Number of Students (<i>f</i>)	Percentage (%)
$X_3 > 217$	Very Good	20	6.94
$194 < X_3 \leq 217$	Good	70	24.31
$171 < X_3 \leq 194$	Enough	105	36.46
$149 < X_3 \leq 171$	Less	70	24.31
$X_3 \leq 149$	Very Less	23	7.99
Total		288	100

Source: Primary data processed (2020)

The percentage category of physics learning discipline for students of class XI IPA at state senior high schools in Takalar regency shows that the largest data frequency is in the enough category with a percentage of 36.46 % while the smallest data frequency is in the very good category with a percentage of 6.94 %. Learning discipline is one of the factors that can affect critical thinking skills. Learning discipline is formed through habits created by the students themselves. The strong desire from within students to learn regularly is what ultimately encourages awareness to be able to use their thinking abilities intellectually in making decisions.

3.5. Critical Thinking Ability Viewed from the Motivation of Students in Class XI IPA Senior High Schools in Takalar Regency

Based on the results of simple linear regression analysis data processing using SPSS 20, the relationship between learning motivation and critical thinking skills of physics class XI IPA students of senior high schools in Takalar regency can be seen in Table 5.

Table 5. Correlation between Learning Motivation and Physics Critical Thinking Ability

Model Summary				
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.379 ^a	.144	.141	6.404

a. Predictors: (Constant), Learning motivation

Table 5 shows that the magnitude of the correlation coefficient (*r*) is 0.379, where it can be said that learning motivation and critical thinking skills in physics have a significant positive relationship. That is, the better the students' motivation to learn, the better the ability to think critically in physics. To state the size of the contribution of the learning motivation variable to the critical thinking ability of physics, the coefficient of determination (R^2) is 0.144. This implies that learning motivation contributes 14.4 %

to the ability to think critically in physics, and the remaining 85.60 % is determined by other factors not investigated in this study. Motivation to learn is important in learning. Ennis [12] this is because a person's motivation to learn can be seen from their capacity to learn, answer questions, and their willingness to take responsibility. The stronger the motivation that a person has, it means that that person has good critical thinking skills as well. If you do not have good skills in critical thinking, then someone will always optimize himself to have critical thinking skills.

3.6. Critical Thinking Ability Viewed from the Physics Responsibilities of Students in Class XI IPA Senior High Schools in Takalar Regency

Based on the results of data processing of simple linear regression analysis using SPSS 20, the relationship between learning responsibility and critical thinking skills of physics class XI IPA students of senior high schools in Takalar regency can be seen in Table 6.

Table 6. Correlation of the Relationship between Learning Responsibilities and the Ability to Think Critically in Physics

Model Summary				
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.394 ^a	.155	.152	6.361

a. Predictors: (Constant), Responsibility

Table 6 shows that the magnitude of the correlation coefficient (r) is 0.394, where it can be said that learning responsibility and critical thinking skills in physics have a significant positive relationship. That is, the better the learning responsibility of students, the better the ability to think critically in physics. To state the size of the contribution of the learning responsibility variable to the critical thinking skills of physics, it is called the coefficient of determination (R^2) of 0.155. This implies that the learning responsibility contributes 15.5 % to the critical thinking skills of physics, and the remaining 84.50 % is determined by other factors which are not investigated in this study. One way to improve students' critical thinking skills is the existence of a good learning responsibility in themselves, because if a person is based on a sense of responsibility, he can increase his potential development through learning according to his own expectations and desires and the environment [13].

3.7. Critical Thinking Ability in terms of Physics Learning Discipline Students Class XI IPA Senior High Schools in Takalar Regency

Based on the data processing results of simple linear regression analysis using SPSS 20, the relationship between learning discipline and the critical thinking skills of physics of class XI IPA students of senior high schools in Takalar regency can be seen in Table 7.

Table 7. Correlation Correlation between Learning Discipline and Physics Critical Thinking Ability

Model Summary				
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.352 ^a	.124	.121	6.476

a. Predictors: (Constant), Learning Discipline

The table above shows that the correlation coefficient (r) is 0.352, where it can be said that learning discipline and critical thinking skills in physics have a significant positive relationship. That is, the better the learning discipline of students, the better the ability to think critically in physics. To state the size of the contribution of the learning discipline variable to the critical thinking ability of physics, the

coefficient of determination (R^2) is 0.124. This implies that the learning discipline contributes 12.4 % to the critical thinking skills of physics, and the remaining 87.60 % is determined by other factors that are not investigated in this study. Facione [14] learning discipline is formed through habits created by the students themselves. Discipline in learning will make a person have skills about good learning methods and good character building as well. If it has been accustomed regularly to study, it will not grow lazy to learn. Therefore, getting used to learning is very necessary in developing his potential, especially critical thinking.

3.8. Critical Thinking Ability in terms of Learning Motivation, Responsibility, and Physics Learning Discipline of Class XI IPA Students of Senior High Schools in Takalar Regency

Based on the results of data processing regression analysis of three predictors using SPSS 20, the relationship between learning motivation, learning responsibility, and learning discipline with the critical thinking skills of physics students of class XI IPA senior high schools in Takalar regency can be seen in Table 8.

Table 8. The relationship between Learning Motivation, Learning Responsibility, and Learning Discipline with the Physics Critical Thinking Ability of Students in Class XI IPA Senior High Schools in Takalar Regency

Model Summary									
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics				
					R Square Change	F Change	df1	df2	Sig. F Change
1	.430 ^a	.185	.177	6.268	.185	21.520	3	284	.000

a. Predictors: (Constant), Learning discipline, learning motivation, responsibility

Based on Table 8, it is obtained that the Fcount value is 21.520 with a probability value (Sig) of 0.000. Because the probability value (Sig) $0.001 < 0.05$, the regression equation model based on the research data is significant. So the three predictor regression model can be used to predict the effect of learning motivation (X_1), learning responsibility (X_2), and learning discipline (X_3) with the ability to think critically in physics (Y). Furthermore, to see the regression equation for the three predictors in estimating critical thinking skills in physics (Y) which is influenced by learning motivation (X_1), learning responsibility (X_2), and learning discipline (X_3) can be seen in Table 9.

Table 9. The Coefficient of the Relationship between Learning Motivation, Responsibility for Learning, and Discipline of Learning with the Ability to Think Critically in Physics

Coefficients ^a					
Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
	B	Std. Error	Beta		
(Constant)	-3.177	3.206		-.991	.323
1 Motivation to Learn	.038	.018	.167	2.058	.041
Learning Responsibilities	.048	.024	.174	1.984	.048
Learning Discipline	.046	.021	.152	2.175	.030

a. Dependent Variable: Critical thinking skills

In Table 9, it is known that the constant value (a_0) is -3.177 while the learning motivation regression coefficient (a_1) is 0.038, the learning responsibility regression coefficient (a_2) is 0.048, and the learning discipline regression coefficient value (a_3) is 0.046, so the equation the regression can be written in Equation 1.

$$\hat{Y} = -3,177 + 0,038X_1 + 0,048X_2 + 0,046X_3 \quad (1)$$

This equation shows that the value of the regression constant is -3.177. The regression equation model makes sense, even though the constant is known to be negative. Because the minimum score that can be obtained to be substituted for X_1 (learning motivation), X_2 (learning responsibility), and X_3 (learning discipline) is 58, 52, and 49 respectively. So that at least the critical thinking ability score obtained is 3.777. This means that when the learning motivation, learning responsibility, and learning discipline of students have increased by one unit, the scores of students' critical thinking skills in physics will increase by 0.038, 0.048, and 0.046 at a constant of -3.177. The regression coefficient is positive, so it can be said that the direction of the influence of the variables of learning motivation, learning responsibility, and learning discipline on the variable of critical thinking skills in physics is positive. While the output of the table above, it can be seen that the t value of learning motivation, learning responsibility, and learning discipline is 2.058, 1.984, and 2.175, respectively, with a significance value of 0.041, 0.048, and 0.030 < 0.05. Thus, it can be said that there is a significant (significant) effect of the learning motivation variable (X_1), learning responsibility (X_2) and learning discipline (X_3) on critical thinking skills (Y). Fisher [15] motivation to learn can be realized by the existence of learning responsibility and student learning discipline. This is because the encouragement from within students to learn will arise if students are aware of their duties and responsibilities as a student. Individuals who have learning motivation, learning responsibilities, and learning discipline will look different from others. They always have a strong desire to do better things than before. In addition, they are always looking for opportunities that provide opportunities for personal responsibility in finding answers to the problems at hand. Thus, students will be more active, creative, and focused in developing their potential, especially in critical thinking.

4. Conclusions and Suggestions

Based on the research data, it can be concluded that learning motivation, learning responsibility, learning discipline, and critical thinking skills in physics of class XI IPA students of senior high schools in Takalar Regency are in the category of sufficient, sufficient, sufficient, and good respectively. There is a significant positive relationship between learning motivation and the critical thinking skills of students in class XI IPA. There is a significant positive relationship between responsibility and critical thinking skills in physics of class XI IPA students of senior high schools in Takalar regency. There is a significant positive relationship between learning discipline and the critical thinking skills of students in class XI IPA. As for the implications of these conclusions put forward suggestions, it is hoped that the next researcher will pay more attention to the accuracy and suitability of several indicators of the variables that will be used in the research, and it is hoped that the subject teachers should first instill character education in students, provide understanding, and attention to become a better person.

References

- [1] Mulyasa E 2014 *Pengembangan dan Implementasi Kurikulum 2013* (Bandung: PT. Remaja Rosadakarya).
- [2] Beling J 2005 *J. Phys. Ther. Educ.* **18** 13.
- [3] Fitria K, Suastra I W, and Subratha I N 2015 *J. Jur. Pendidik. Fis.* **2** 5476.
- [4] Asgharheidari F and Tahriri A 2015 *J. Lang. Teach. Res.* **6** 388.
- [5] Tawil M and Liliarsari 2013 *Berpikir Kompleks dan Implementasinya dalam Pembelajaran IPA*

(Makassar: Badan Penerbit UNM).

- [6] Desmita 2016 *Psikologi Perkembangan Peserta Didik* (Bandung: Rosda).
- [7] Abdurrahman M 2014 *Pendidikan Bagi Anak Berkesulitan Belajar* (Jakarta: Rineka Cipta).
- [8] Sugiyono 2015 *Metode Penelitian Pendidikan: Pendekatan Kuantitatif, Kualitatif, dan R&D*. (Bandung: Alfabeta).
- [9] Elliot B, Oty K, McArthur J, and Clark B 2010 *Int. J. Math. Educ. Sci. Technol.* **32** 811.
- [10] Tu'u T 2004 *Peran Disiplin pada Perilaku dan Prestasi Siswa* (Jakarta: Grasindo).
- [11] Yasmin F L, Santoso A, and Utaya S 2016 *J. Pendidik.* **1** 692.
- [12] Ennis R H 2011 *The Nature of Critical Thinking: an Outline of Critical Thinking Dispositions and Abilities* Available from: https://education.illinois.edu/docs/default-source/faculty-documents/robert-ennis/thenatureofcriticalthinking_51711_000.pdf?sfvrsn=7bb51288_2.
- [13] Zanthly L S 2016 *J. Teor. Ris. Mat.* **1** 47.
- [14] Facione P A 2015 *Critical Thinking: What it is and Why it Counts* (California: Measured Reasons LLC).
- [15] Fisher A 2014 *Berpikir Kritis: Sebuah Pengantar* (Jakarta: Erlangga).