Malikussaleh Journal of Mathematics Learning (MJML)
Vol. 2, No. 1, May 2019, pp. 23-28
ISSN 2620-6315 (print), 2620-6323 (online)
DOI: https://doi.org/10.29103/mjml.v2i1.756

# Relationship between Cognitive Style and Habits of Mind

**Hayatun Nufus[1]*, Rezi Ariawan[2]**

[1]Department of Mathematics Education, UIN Suska Riau, Pekanbaru, Indonesia
[2]Department of Mathematics Education, Universitas Islam Riau, Pekanbaru, Indonesia
*Corresponding author: hayatun.nufus@uin-suska.ac.id | Phone Number: +6281378340246

## ARTICLE HISTORY

Received : **29 August 2018**
Revised : **10 December 2018**
Accepted : **6 March 2019**

## KEYWORDS

*Cognitive Style;*
*Habits of Mind*

## ABSTRACT

This research is a correlational study that examines the relationship between cognitive style and habits of mind. The research subjects involved 4th semester students in the Department of Mathematics Education at the Faculty of Tarbiyah and Teacher Training of UIN Suska Riau which consisted of students with heterogeneous academic abilities. Cognitive style data was collected using the GEFT question instrument with test techniques. Habits of mind data were collected using a questionnaire instrument with a questionnaire distribution technique. The data analysis technique begins with the Pearson Product Moment correlation test which is continued with the significance test and the calculation of the magnitude of the relationship that occurs using the coefficient of determination. Because the data is positively correlated, it continues with determining the linear regression equation. The results showed that there was a significant weak correlation between cognitive style and habits of mind with a relationship score of 6% and a linear regression equation y '= 36.35 + 0.31 x.



## 1. INTRODUCTION

Every individual has his own ways of managing what he thinks, what he does, what he sees, and what he remembers. Individuals will also have different ways of approaching the learning situation, especially in the way they receive, organize and relate their experiences in their efforts to respond to what they receive. The differences inherent in each individual in the way they process information and arrange it from their experiences are better known as cognitive style (Labunan in Ariawan and Hayatun, 2017).

In mathematics learning, as in other learning, cognitive style also influences students in processing the learning material they receive by reconnecting what they already have. This process will certainly be different for each student, depending on their personal characteristics and level of intelligence. This is as stated by Sternberg and Elena (1997) that cognitive style is a bridge between intelligence and personality. Furthermore, Woolfolk (Darmono, 2012) argues that cognitive style is a different way to see, recognize, and organize information. Every individual has a certain preferred way of processing and organizing information in response to the stimulation of their environment. A person's cognitive style can show individual variation in terms of attention, receipt of information, remembering, and thinking that appear or differ between cognition and personality.

Based on the description above, it is clear that cognitive style is a very important thing in learning activities. Therefore, researchers consider it necessary to conduct research related to cognitive style.

The dimensions of cognitive style consist of independent fields and dependent fields (Ariawan and Hayatun, 2017) where both have characteristics and differences from each other. O'Brien et al (Suryanti, 2014) states the differences between individual dependent fields and independent fields, namely:

1. Individual Independent Fields have the following characteristics:
a. Having a higher analysis in the reception and processing of information, so it is often referred to as "analytical thinking".
b. Demonstrate a tendency to organize information into manageable units and have greater capacity for information storage. Individuals or individuals belonging to the Independent Field are accustomed to using problem solving, organization, analysis and structuring techniques when involved in learning and working situations.
2. Individual Field Dependents have the following characteristics:
a. Students with Field Dependents are more global and holistic in processing perceptions and information so that they are often referred to as "global thinkers".
b. Tends to accept information as it is presented or encountered and relies mostly on memorization.

Based on the opinion above, the cognitive style referred to in this study consists of two forms, namely independent fields and dependent fields.

Another factor that also influences students in receiving learning material is the aspect of habits of mind. According to Costa and Kallick (2008) habits of mind can be associated with high-level learning. This happens when individuals are continually pressured by constructive questions, forced to accept challenges, must find unusual solutions, explain concepts, express reasons, and process information.

The conditions revealed by Costa and Kallick above are often raised in mathematics learning, especially mathematics in tertiary institutions. Students certainly need intelligence that becomes their habitual behavior in solving these problems. This is as stated by Marita (2014) which states that habits of mind are a group of skills, attitudes, and values that enable individuals to bring up performance or intelligence behavior based on the stimulus provided to guide the individual in facing or resolving issues existing issues.

Habits of mind itself has been developed by several experts, one of them is Robert J. Marzano. According to Robert J. Marzano in Rahmat (2007), habits of mind is one of five dimensions of learning, namely: (1) attitude and perception (attitude and perceptions); (2) acquiring and integrating knowledge (acquire and integrate knowladge); (3) developing or refining knowledge (extending and refening knowladge); (4) using knowledge meaningfully (using knowladge meaningfull); (5) habits of mind (habits of mind).

Based on these explanations, it can be concluded that habits of mind are very important aspects to be explored, so researchers also feel the need to conduct research related to habits of mind. Therefore, this study is entitled "Relationship between cognitive style and habits of mind".

## 2. RESEARCH METHOD

This type of research used in this study is correlational research. The researcher aims to find a connection between cognitive style and the habits of mind of students without first giving any treatment.

This research was conducted in the even semester of the academic year 2017/2018 in the mathematics education department of the Tarbiyah and Teacher Training Faculty of UIN Suska Riau. The subject of the research is the 4th semester students majoring in Mathematics education.

Data collection instruments consist of two instruments. The first instrument is used to measure or identify a student's cognitive style. This instrument is in the form of a cognitive style test that was developed by Witkin (1977) called the GEFT (Group Embedded Figures Test). GEFT is a test where each individual is directed to look for a series of simple forms that are in a more complex and larger form.

GEFT is a standard test in America, so changes to GEFT are not possible. The GEFT test has measured its reliability level of 0.84, meaning that the reliability of this GEFT is very high (Khodadady and Ta-faghodi in Ulya, 2015).

GEFT consists of three parts, where the first part consists of eight questions that only serve as an exercise so the results are not taken into account, then the second and third parts consist of 9 questions, each given a score of 1 for the correct answer and 0 for the answer given is wrong. In determining the group of students belonging to the Independent Field (FI) and Field Dependent (FD) categories are used formulated by Gordon and Wyant (1994) where scores from 0-11 are categorized as FD groups and scores from 12-18 are categorized as FI groups.

The use of the GEFT test instrument in this study with the reasons:

1. This test is complemented by an initial test, making it easier for students to adapt and can easily work on the next section.
2. The time needed to do this test is quite short.
3. This test is easily done by students, and does not require expertise and special skills.
4. This test is reliable and valid through several tests that have been done by several experts.

The second instrument is used to get information about students' habits of mind. To get this information, the researcher needs a habit of mind questionnaire. The habit of mind questionnaire sheet is arranged based on the determined habits of mind indicator. The indicator was developed based on selected aspects of habits of mind, namely: self regulation, critical thinking, and creative thinking.

Self regulation includes: being aware of one's own thoughts, making plans effectively, being aware of and using the necessary sources of information, sensitive to feedback, evaluating the effectiveness of actions. Critical thinking includes: being accurate and looking for accuracy, being clear and looking for clarity, being open, refraining from being impulsive, being able to position yourself when there is a guarantee, being sensitive and knowing the abilities of his friends. While creative thinking includes: being able to engage in a task even though the answers and solutions are not immediately apparent, making the maximum effort of his abilities and knowledge, generating new ways of seeing situations that are different from the usual ways that prevail in general (Marzano in Rustaman, 2008).

Data collection was carried out with two techniques, namely the test technique and the questionnaire technique. Test technique to collect student cognitive style data. The questionnaire technique was used to collect data on students' habits of mind.

The first step taken is to do a test using the first instrument to obtain a group of students' cognitive styles. Students are given a test in the form of GEFT, then researchers analyze and group according to the data that has been obtained. The next step is giving habits of mind questionnaire to students. This questionnaire was given to obtain data in the grouping of habits of mind scores of students.

Data processing and analysis is done by using the bivariate correlation test, the Pearson Product Moment correlation, because the data obtained in the form of interval data to find the relationship between two variables, namely cognitive style and habits of mind students. Processing this data using the help of Ms. Excel.

The first step taken is to test the correlation coefficient using the Pearson Product Moment formula. The use of this correlation is because the data used in the calculation is in the form of 0-18 intervals for GEFT scores and 1-60 for students' habits of mind scores. The Pearson Product Moment correlation formula is as follows (Riduwan, 2010):

$$r = \frac{n.(\sum XY) - (\sum X).(\sum Y)}{\sqrt{\{n.(\sum X^2) - (\sum X)^2\}.\{n.(\sum Y^2) - (\sum Y)^2\}}}$$

Information:
n = number of samples
X = score of student cognitive style (GEFT score)
Y = student habits of mind score

The guidelines for providing interpretations of the correlation coefficients obtained from the calculation can be seen in the following table (Sugiyono, 2011):

**Table 1**. Guidelines for Interpretation of Correlation Coefficients

| Coefficient interval | Relationship Level |
|---|---|
| 0,00 – 0,199 | Very Low |
| 0,20 – 0,399 | Low |
| 0,40 – 0,599 | Medium |
| 0,60 – 0,799 | Strong |
| 0,80 – 1,000 | Very Strong |

$$t_{Count} = \frac{r\sqrt{n-2}}{\sqrt{1-r^2}}$$

If $t_{count} \geq t_{table}$, then H0 is accepted, meaning that there is a significant relationship / correlation and vice versa (significance level of 0.05).

If the correlation coefficient is significant, the magnitude of influence between variables can be sought by the determinant coefficient (determination), with the formula (Riduwan, 2010):

$$KP = (r)^2 \times 100\%$$

The next step is to calculate the average cognitive style and habits of mind of students, then proceed with processing the data using the prerequisite test in the analysis of linear regression model data. The formulas used are based on Riduwan and Sunarto (2013):

$$y' = a + bx$$

with

$$b = \frac{n.\sum XY - \sum X.\sum Y}{n.\sum X^2 - (\sum X)^2} \text{ dan } a = \frac{\sum Y - b.\sum X}{n}$$

value b is the value of the direction as a determinant of predictions that shows the value of the increase/state is directly proportional (+) or the value of the decrease/state is inversely proportional (-).

## 3. RESULT AND DISCUSSION

### 3.1. GEFT Test Result Data and Student Classification based on Cognitive Style

GEFT test questions are given to students to be able to know each student's cognitive style and divide them into two types of cognitive styles, namely independent field (analytic thinker) and field dependent (global thinker). The recapitulation of the GEFT test results can be seen in the following table:

**Table 2**. Descriptive Statistics of Recapitulation Student GEFT Score

| Part | Number of Respondents | Max Score | Min Score | Total score | Average |
|---|---|---|---|---|---|
| I (easy) | 61 | 8 | 0 | 461 | 7,56 |
| II (is on) | 61 | 9 | 0 | 312 | 5,11 |
| III (difficult) | 61 | 9 | 0 | 324 | 5,31 |

The number of questions in parts I, II, and III are 8, 9, and 9, respectively. Therefore, the ideal maximum score for each section in sequence is 8, 9, and 9. Based on the above table, statistically descriptive students are very easy to answer the questions in the first part and it looks very difficult in answering questions in the second and third parts. This can be seen from the average and the total score for each section.

In the first part, the average score is 7.56. This average score is close to the ideal maximum score of 8 and the percentage of completeness answers is 94.5%. That is, there are only a maximum of 4 students who do not get the full score of 8.

In the second part, the average score is 5.11. This average score is almost half of the ideal maximum score of 8 and the percentage of completeness answered by 63.875%. That is, there are only a maximum of 22 students who did not get the full score of 8.

In the third part, the average score is 5.31. This average score is close to the ideal maximum score of 8 and the percentage of completeness answered by 66.375%. That is, there are only a maximum of 21 students who did not get the full score of 8.

Because the division of cognitive style groups only pay attention to the total score of the second and third parts, the grouping of students based on cognitive style can be seen in the following table:

**Table 3.** Summary of Student Grouping based on Cognitive Style

| Types of Cognitive Styles | Many students | Student Name Code |
|---|---|---|
| Field Independent | 27 people | R-34, R-35, R-37, R-56, R-59, R-32, R-36, R-54, R-2, R-14, R-29, R-30, R-31, R-46, R-9, R-11, R-24, R-26, R-27, R-41, R-60, R-4, R-6, R-28,R-42, R-55, dan R-58 |
| Field Dependent | 34 people | R-3, R-47, R-50. R-61, R-1, R-20, R-40, R-45, R-57, R-10, R-13, R-23, R-25, R-43, R-16, R-17, R-39, R-44, R-51, R-52, R-53, R-7, R-8, R-18, R-21, R-22, R-38, R-5, R-12, R-19, R-48, R-49, R-15, dan R-33 |

### 3.2. Questionnaire Results Data Habits of Mind and Grouping Students based on Cognitive Style

Habits of mind questionnaire is given to students so that researchers can group students into three groups of habits of mind, namely self regulation, critical thinking, and creative thinking. The descriptive statistics summary of the results of the habits of mind questionnaire can be seen in the following tables 4.

**Table 4.** Descriptive Statistics of the Questionnaire Score Recapitulation Habits of Mind (HoM)

| HoM Category | Item No | Maks Score | Min score | Score | Average | Persentase |
|---|---|---|---|---|---|---|
| Self Regulation | 1 | 4 | 1 | 191 | 3,1 | 78,3 |
| | 2 | 4 | 1 | 192 | 3,1 | 78,7 |
| | 3 | 4 | 1 | 171 | 2,8 | 70,1 |
| | 4 | 4 | 2 | 197 | 3,2 | 80,7 |

| | | | | | | |
|---|---|---|---|---|---|---|
| | 5 | 4 | 2 | 191 | 2,7 | 78,3 |
| Critical Thinking | 6 | 4 | 1 | 193 | 3,2 | 79,1 |
| | 7 | 4 | 2 | 150 | 2,5 | 61,5 |
| | 8 | 4 | 2 | 226 | 3,7 | 92,6 |
| | 9 | 4 | 1 | 191 | 3,1 | 78,3 |
| | 10 | 4 | 1 | 199 | 3,3 | 81,6 |
| Creative Thinking | 11 | 4 | 1 | 163 | 2,7 | 66,8 |
| | 12 | 4 | 1 | 178 | 2,9 | 73,0 |
| | 13 | 4 | 1 | 175 | 2,9 | 71,7 |

Note: the ideal maximum score of each item = 4

Guided by the results of the habits of mind questionnaire, the researchers grouped students into three categories of habits of mind (self regulation, critical thinking, and creative thinking). The grouping can be seen in the following table:

**Table 5.** Classification of Students based on Habits of Mind for the Self Regulation Category

| Self Regulation Category | Many students | Student name |
|---|---|---|
| Very bad | 0 | - |
| Not good | 0 | - |
| Pretty good | 9 people | R-3, R-5, R-14, R-18, R-21, R-32, R-57, R-12, dan R-19 |
| Well | 32 people | R-4, R-8, R-10, R-13, R-24, R-25, R-31, R-34, R-40, R-53, R-54, R-55, R-58, R-9, R-11, R-16, R-17, R-20, R-30, R-33, R-39, R-47, R-51, R-1, R-2, R-6, R-27, R-38, R-7, R-15, R-28, dan R-48 |
| Very good | 20 people | R-60, R-36, R-44, R-49, R-56, R-59, R-19, R-22, R-41, R-42, R-45, R-46, R-61, R-23, R-26, R-35, R-37, R-43, R-50, dan R-52 |

In the table above, none of the students is at the level of self regulation that is not very good or bad. Most of the students are in the good self regulation category, which is 52.46%. A small portion are at a fairly good level (14.75%) and some others are at a very good level (32.79%).

**Table 6.** Classification of Students by Habits of Mind for the Critical Thinking Category

| Critical Thinking Category | Many students | Student name |
|---|---|---|
| Very bad | 0 | - |
| Not good | 0 | - |
| Pretty good | 4 people | R-5, R-15, R-21, dan R-14 |
| Well | 33 people | R-16, R-18, R-22, R-27, R-28, R-30, R-31, R-45, R-48, R-53, R-56, R-1, R-2, R-4, R-8, R-19, R-25, R-32, R-41, R-49, R-57, R-6, R-7, R 0, R-12, R-29, R-34, R-46, R-51, R-58, R-3, R-23, dan R-38 |
| Very good | 24 people | R-36, R-35, R-60, R-37, R-39, R-43, R-44, R-52, R-61, R-9, R-11, R-13, R-17, R-20, R-24, R-26, R-33, R-40, R-42, R-47, R-50, R-54, R-55, dan R-59 |

In the table above, none of the students are at the level of critical thinking that is not very good and not good, as in the category of self regulation. Most students are in the level of good critical thinking, which is as much as 54.10%. A small portion are at a fairly good level (6.56%) and some others are at a very good level (39.34%).

**Table 7.** Classification of Students by Habits of Mind for the Creative Thinking Category

| Critical Thinking Category | Many students | Student name |
|---|---|---|
| Very bad | 0 | - |
| Not good | 8 people | R-1, R-6, R-15, R-18, R-7, R-12, R-3, dan R-32 |
| Pretty good | 34 people | R-13, R-17, R-21, R-22, R-23, R-26, R-30, R-37, R-39, R-56, R-61, R-2, R-10, R-11, R-16, R-19, R-20, R-25, R-27, R-33, R-38, R-40, R-47, R-51, R-54,R-4, R-5, R-8, R-14, R-24, R-28, R-29, R-53, dan R-57 |
| Well | 19 people | R-36, R-42, R-44, R-45, R-48, R-50, R-58, R-59, R-60, R-9, R-31, R-34, R-35, R-41, R-43, R-46, R-49, R-52, dan R-55 |
| Very good | 0 | - |

In the table above, none of the students are at the creative level, thinking very poorly and very well. Most students are in the creative thinking category which is quite good, which is as much as 55.74%. A small proportion are at good levels (31.15%) and only a very few are at bad levels (13.11%).

**Table 8.** Classification of Students based on Habits of Mind Overall

| Overall | Many students | Student name |
|---|---|---|
| Very bad | 0 | - |
| Not good | 0 | - |
| Pretty good | 8 people | R-7, R-5, R-15, R-32, R-14, R-29, R-3, dan R-12 |
| Well | 30 people | R-17, R-19, R-40, R-54, R-58, R-11, R-20, R-24, R-30, R-33, R-34, R-47, R-48, R-16, R-23, R-25, R-53, R-4, R-8, R-10, R-27, R-2, R-51, R-28, R-1, R-38, R-6, R-18, R-21, dan R-57 |
| Very good | 23 people | R-36, R-60, R-44, R-59, R-35, R-42, R-43, R-45, R-50, R-52, R-61, R-37, R-49, R-56, R-22, R-26, R-41, R-55, R-9, R-13, R-31, R-39, dan R-46 |

In the table above, none of the students are at the level of habits of mind which is not very good or bad. Most students are in the category of good self regulation, which is 49.18%. A small proportion are at very good levels (37.71%) and very few are at good enough levels (13.11%).

### 3.3. Relationship of Cognitive Style and Habits of Mind Students

The first step taken in determining whether there is a relationship between cognitive style and habits of mind of students is to do calculations using the Pearson / Product Mo-ment correlation coefficient test. Based on the calculation results, it is found that the correlation coefficient value is 0.242. Based on table 3.1, it is known that the correlation that occurs is low. In addition, because the correlation is positive, the relationship is positive, but weak. That is, if a student's cognitive style is good, then his habits of mind are good and vice versa, but the relationship is weak.

The next step that needs to be done is to determine whether a weak relationship is significant or not. This is done by calculating using the t-test, i.e. determining the t-count and comparing it to the t-table. Based on the calculation results, it was obtained that. After looking at the price table t, it is obtained. Furthermore, because, then Ho is accepted, meaning that there is a significant relationship between cognitive styles with habits of mind.

After knowing the results of statistical calculations show that there is a significant correlation between cognitive style and habits of mind, then the next step is to calculate the amount of influence between variables. Based on the calculation results obtained KP / determination coefficient of 6%. This means that 94% is contributed by other factors.

$$y' = 36{,}35 + 0{,}31x$$

In addition to finding out how much the influence of the relationship that occurs, it is also necessary to determine whether the relationship is positive or not. This is done by processing the data using the prerequisite test in the analysis of linear regression model data. The linear regression model formula produced is:

In the formula above, the coefficient x (value b) is positive 0.31, so the relationship is positive. That is, the better the cognitive style of students, the better the habits of mind. The regression model with this equation also means that each increase in one score of cognitive style will be followed by an increase in students' habits of mind by 0.31 units at a constant 36.35. These results are in line with the positivity to the resulting correlation coefficient.

Therefore, the more students who have an independent cognitive field style, the more students will have good habits of mind. That is, the more capable a student is in studying mathematics in detail, in depth, analytically, and has a good mastery of problem solving, the more able he is to organize himself, think critically, and think creatively. These abilities must be possessed by a mathematics learner to be able to properly understand each concept of learning material and use it to solve problems.

## 4. CONCLUSION

Based on the results of research and discussion, it can be concluded that:

1. There is a significant relationship between cognitive style with students' habits of mind
2. The relationship between cognitive style and habits of mind is positive and weak
3. The magnitude of the influence of the relationship that occurs between the ognitive style and habits of min is 6% and 94% influenced by other factors

Based on the discussion and findings in the field, the researcher suggests that more in-depth research related to the relationship between cognitive style and habits of mind is needed to obtain further data why the effect of the relationship between the two is so small (6%) by conducting deeper search activities , such as conducting interviews with research subjects, expanding research subjects, and so forth

## REFERENCES


Ariawan, rezi dan Hayatun Nufus. (2017). Profil Kemampuan Koneksi Matematis Mahasiswa dalam Menyelesaikan Masalah pada Mata Kuliah Kalkulus 1 ditinjau berdasarkan Gaya Kognitif. *Suska Journal of Mathematics Education*, 3(2), 102 – 110.

Costa, A. L dan Kallick, B. (2008). Changing Perspective About Intelligence, *Learning and Leading with Habits of Mind 16 Esential Characteristic for Success*, (pp. 5-14). Virginia: Association for Supervision and Curriculum Development.

Darmono, Al. (2012). Identifikasi Gaya Kognitif (Kognitive Style) Peserta Didik dalam Belajar. *Al Mabsut: Jurnal Studi Islam dan Sosial*, 3(1), 63-69.

Gordon, H.R., & Wyant, L. J. (1994). Cognitive Style of Seleceted International and Domestic Graduate Students at Marshall University. *Report Research*, (2-19). Marshall University

Marita, Rose Ash Shidiqi. (2014). *Identifikasi Habits of Mind Siswa Praktikum dalam Diskusi serta Pengaruhnya terhadap Penguasaan Konsep Sistem Organ* (Tesis , Universitas Pendidikan Indonesia).

Rahmat, Adi. (2007). Learning Dimension based Teaching. *Simposium Nasional Penelitian Pendidikan Pusat Penulisan Kebijakan dan inovasi Pendidikan*, (1-9). Balitbang-Depdiknas.

Riduwan. (2010). Uji Pearson Product Momen, *Dasar-dasar Statistika,* (pp. 227-232). Bandung: Alfabeta.

Riduwan dan Sunarto. (2013). Regresi Sederhana, *Pengantar Statistika untuk Penelitian Pendidikan, Sosial, Ekonomi, Komunikasi, dan Bisnis*, (pp. 95-106). Bandung: Alfabeta.

Rustaman, N.Y. (2008). Habits of Mind in Learning Science and its Assessment. *Konferensi Nasional Pendidikan Indonesia VI: Pendidikan Bermutu untuk Semua ,(*pp. 1-19*).* Universitas Pendidikan Ganesha.

Sternberg, R.I dan Elena, L.C. (1997). Are Cognitive Style Still in Style?. *American Psychologist Association*, 52(7), 700-712.

Sugiyono. (2011). Pengujian Hipotesis Asosiatifl. *Metode Penelitian Pendidikan (Pendekatan Kuantitatif, Kualitatif, dan R&D,* (pp.224-259). Bandung: Alfabeta.

Suryanti, Nunuk. (2014). Pengaruh Gaya Kognitif terhadap Hasil Belajar Akuntansi Keuangan Menengah 1. *Jurnal Ilmiah Akuntansi dan Humanika Jinah,* 4(1), pp.1393 – 1406.

Ulya, Himmatul. (2015). Hubungan Gaya Kognitif Dengan Kemampuan Pemecahan Masalah Matematika Siswa. *Jurnal Konseling GUSJIGANG*, 1(2), pp. 1-12.

Witkin, H.A., Moore, C.A., Goodenough D.R., and Cox, P.W. (1977). Field Dependent and Field Independent Cognitive Styles and Their Educational Implications. *Review of Educational Research Winter*. 47(1), 1-64.