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Relationship of mathematical thinking ability to entrepreneurial work styles in the work environment in the industrial age 4.0

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Abstract. The industrial era 4.0 emphasizes the pattern of digital economy, artificial intelligence, big data, robotic, and destructive innovation phenomena whose challenges are far more severe. The work style that is in accordance with these conditions is the work style of an entrepreneur who has the elements of being able to anticipate change, visionary, think strategically, flexibly, initiate change, be oriented towards the future. The thought process that is expected to form individuals to get used to the entrepreneur's work style includes the process of mathematical thinking. Research examines the relationship between the mathematical thinking ability and entrepreneur's work style. The research method uses descriptive correlational with a quantitative approach. The research subjects consisted of 55 employees at one of the private universities. The instrument is a mathematical thinking ability questionnaire and an entrepreneur work style questionnaire. The conclusion is that there is a relationship between the mathematical thinking and the entrepreneur's work style. The mathematical thinking ability significantly affects the entrepreneur's work style. Relations that occur are categorized as strong and unidirectional. The better the individual's mathematical thinking ability lead to the better the individual entrepreneur's work style. The mathematical thinking ability in the research subject is dominant with a score of 4, meaning that employee involvement in organizational development can be relied upon. The entrepreneur's work style in the research subject is also dominant with a score of 4, meaning that the work style of the employee supports in facing the challenges of the organization in the industrial era 4.0.

1. Introduction

Every social creature always interacts with its environment. These interactions are related to various relationship patterns and form a social convention when the interaction occurs. Interaction patterns are influenced by individual needs both different and the same [1]. In addition, the environment has an important role in the pattern of interaction. Rapid change, technology, culture, and lifestyle can result in conflicts of interest in interacting.

Increasingly sophisticated technological developments in which the world entered the industrial era 4.0 that emphasized the pattern of digital economy, artificial intelligence, big data, robotic, and the destructive innovation phenomenon the challenges were far more severe [2]. The pattern of work style must be able to respond to the challenge, so it must be adaptive quickly while maintaining Indonesian character. To respond to the needs of the organization in order to adjust to the industrial era 4.0 change-oriented organizational actors and individuals who have the inspiration to fight for the vision have been needed. Individuals are expected to be able to think long-term, innovative, creative, build



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commitment to achieve organizational goals, innovate, and be creative about changes that are innovative and destructive.

The work style that is in accordance with the conditions mentioned above is the entrepreneurial work style who has the elements, namely the ability to anticipate change, visionary, think strategically, be flexible, initiate change, be future-oriented [3]. In the element of anticipating change, someone who has an entrepreneurial work style is able to understand the characteristics of change based on understanding so that anticipation is carried out in a scientific way based on empirical data [4]. Strategic thinking is the process of thinking about big things that will affect the organization as a whole, and consider all factors both internal and external to the organization.

Flexible elements in the work style of an entrepreneur are flexible in facing various opportunities and possibilities that occur within the organization both internal and external. A very fast change situation requires flexibility so that the opportunity that is owned does not just disappear. The entrepreneur's work style can initiate change, not just waiting for change, but also starting to change, build, and develop new things. The last element of the entrepreneur's work style is future-oriented. The future orientation of someone who has an entrepreneurial work style is not limited to desire, but encourages members to work to a higher level of performance and determine innovative strategies in achieving goals.

Based on the description above, the entrepreneur's work style is the ability to anticipate various changes with a clear vision of the future and try to encourage cooperation in making changes through flexibility in carrying out its role in managing the organization. Someone with an entrepreneurial work style tries to use his influence to make the activities of the organization have a different position through various policies that can improve organizational performance even though the things done will be different from others, and this is done with a belief and optimism.

The thinking process that is expected to form individuals to get used to the entrepreneur's work style includes the process of mathematical thinking. The mathematical thinking ability is a dynamic process that broadens understanding and involves mathematical skills, such as estimation, induction, deduction, specification, generalization, analogy, reasoning, and verification [5]. The mathematical thinking process involves steps taken simultaneously, namely dividing the task into several components, identifying similar tasks that can help identify appropriate knowledge and skills, identifying assumptions, choosing the right strategy, considering alternative approaches, looking for patterns or connections, and producing models [6]. The process of mathematical thinking can be applied through illustrations of character development; investigation; collaborative exploration; creative performance; communication; and awards [7].

The mechanism of the process of mathematical thinking is the same as the process of cognition in general, which includes translation, integration, planning, and implementation. In the mechanism of the mathematical thinking process there is also a strategy for structuring the thinking frame to arrive at the goals to be achieved. This frame of mind will be the gateway for new ideas and ideas to emerge, because an important component in mathematical thinking is how one can reflect on himself, namely the ability to go back and reflect on the steps being taken. In general, mathematical thinking is the ability to think rationally, examine existing phenomena, and compile procedurally mathematics and build a frame of mind as self-confidence resolves every problem. Therefore, we can face every problem and explore this life in a directed manner.

Based on the description above, this research will be reviewed: Is there a relationship between mathematical thinking ability and entrepreneurial work style ?; How is the relationship between mathematical thinking ability and entrepreneurial work style ?; How is the support of employees on aspects of the mathematical thinking ability?; How is employee support for the entrepreneur's work style in achieving organizational goals?

2. Method

This study is to obtain an overview of the relationship between the mathematical thinking ability about an entrepreneur's work style. The method used is descriptive correlational with a quantitative approach. The research subjects consisted of 55 employees at one of the private universities. The

instrument used is a mathematical thinking ability questionnaire and a work style questionnaire, each of which consists of 6 items. The questionnaire refers to a Likert scale using 1-5 scoring.

Questionnaire data was processed using SPSS 19 software. If the questionnaire data was normally distributed, the statistical test used was the Pearson Correlation Test. If the questionnaire data is not normally distributed, the statistical test used is the Rho Spearmen Test. The statistical hypothesis in the normality test is as follows:

H0 : Questionnaire data is normally distributed

H1 : Questionnaire data are not normally distributed

Criteria for testing the hypothesis of the normality test statistic using SPSS 19, namely if the Sig. < 0.05 so reject H0 stated questionnaire data are not normally distributed. If the value of Sig. ≥ 0.05 , then accept H0 it is stated that the questionnaire data is normally distributed.

The statistical hypothesis in the correlation test is as follows:

H0 : There is no relationship between the mathematical thinking ability with an entrepreneur's work style.

H1 : There is a relationship between the mathematical thinking ability with an entrepreneur's work style.

The hypothesis testing criteria using SPSS is if the Sig. < 0.05 , then rejecting H0 is stated to have a significant relationship between mathematical thinking ability and entrepreneurial work style. If the value of Sig. ≥ 0.05 , then accepting H0 is stated that there is no significant relationship between the mathematical thinking ability with an entrepreneurial work style.

The direction of the relationship is determined by the sign of the coefficient that is when the Pearson Correlation is negative (-) indicates that the better the mathematical thinking ability the more the entrepreneur's work style is not good. If the Pearson Correlation (+) indicates that the better the mathematical thinking ability, the better the entrepreneurial work style. The level of strength of the relationship is based on the results of SPSS output as shown in Table 1 below.

Table 1. Criteria for strength level relations between variables

Coefficient	Strength
1.00	Perfect
0.76-0.99	Very strong
0.51-0.75	Strong
0.26-0.50	Strong enough
0.00-0.25	Very weak

3. Result and Discussion

3.1. Data Normality Test

Questionnaire data on the mathematical thinking ability and entrepreneurial work style are tested for normality to obtain information about the distribution of normally distributed data. The results of the normality test from the SPSS 19 output in Table 2 below.

Table 2. The output of the data normality test

	Tests of Normality					
	Kolmogorov-Smirnov ^a			Shapiro-Wilk		
	Statistic	df	Sig.	Statistic	df	Sig.
Mathematical_Thinking	0.134	55	0.015	0.948	55	0.019
Entrepreneurial_Work_Style	0.218	55	0.000	0.897	55	0.000

a. Lilliefors Significance Correction

Table 2 shows that the value of Significance (Sig.) Mathematical thinking ability is 0.019 and the Significance (Sig.) of entrepreneurial work force is 0.000. The two Significance values (Sig.) are smaller than the significance level of 0.05 so it is stated that the questionnaire data is not normally distributed.

3.2. Correlation Test

Questionnaire data are not normally distributed so as to analyze the relationship between mathematical thinking ability and entrepreneurial work styles using the Spearman Rho Test. The Spearman Rho Test results from the SPSS 19 output in Table 3 below.

Table 3. The output of the correlation test

Correlations			Mathematical_Thinking	Entrepreneurial_Work_Style
Spearman's rho	Mathematical_Thinking	Correlation Coefficient	1.000	0.643**
		Sig. (2-tailed)	-	0.000
		N	55	55
	Entrepreneurial_Work_Style	Correlation Coefficient	0.643**	1.000
		Sig. (2-tailed)	0.000	-
		N	55	55

** . Correlation is significant at the 0.01 level (2-tailed).

Table 3 shows that the value of Significance (Sig. 2-tailed) is 0.000 smaller than the significance level of 0.05 so that there is a significant relationship between the mathematical thinking ability and the entrepreneurial work style. The correlation coefficient of 0.643 is in the interval 0.51-0.75 (see Table 1), which means that the strength of the relationship between mathematical thinking ability and entrepreneurial work force is classified as strong. The direction of the relationship on the correlation coefficient is positive which states the better the mathematical thinking ability, the better the entrepreneurial work style. Entrepreneur's work style allows to produce ideas having the ability to control themselves and direct actions that are part of mathematical thinking [8]. According to [9] that the direct and positive relationship between mathematical thinking and entrepreneurship.

3.3. Mathematical Thinking Ability Questionnaire

Questionnaire for the mathematical thinking ability with regard to statements about the completion of work on schedule; work according to priorities, procedures and stages; coordinate and divide tasks; take alternative steps; to be responsible; and apply assignments. Employees give a score of 1-5. The percentage of employee responses to the items of the mathematical thinking ability questionnaire is shown in Table 4 below.

Table 4. Percentage of mathematical thinking ability

No.	Statement	Percentage				
		1	2	3	4	5
1.	I am able to complete every job on schedule	0	5.45	20.00	63.64	10.91
2.	I work according to priorities, procedures and stages	0	12.73	5.45	58.18	23.64
3.	I am able to coordinate and share tasks with fellow employees	0	3.64	9.09	72.73	14.55
4.	I was able to take alternative steps when finding problems in completing work	0	5.45	21.82	50.91	21.82
5.	I can take responsibility for the assignment given	0	18.18	18.18	49.09	14.55
6.	I was able to apply the tasks given to the technical steps	0	0	14.55	58.18	27.27

Table 4 shows that each item in the questionnaire statement dominant mathematical thinking ability scores 4. The largest percentage is 72.73, shows that employees who have mathematical thinking ability are mostly able to coordinate and share tasks with other employees. They are also able to complete each job on schedule with a percentage of 63.64.

3.4. Entrepreneurial Work Style Questionnaire

Entrepreneurial work style questionnaires relating to good relations between employees, courage to express opinions, share assignments, provide explanations, a conducive working atmosphere, and a reward/punishment system. Percentage of employee responses to the items in the entrepreneur work style questionnaire statement in Table 5 below.

Table 5. Percentage of entrepreneurial work style

No.	Statement	Percentage				
		1	2	3	4	5
1.	I have good relations with fellow employees	0	0	12.73	50.91	36.36
2.	I dare to start expressing my opinion	0	7.27	23.64	36.36	32.73
3.	I can share the task well	0	10.91	9.09	52.73	27.27
4.	I can provide explanations and encouragement to fellow employees	0	0	9.09	60.00	30.91
5.	I am happy with the conducive working atmosphere	0	18.18	27.27	25.45	29.09
6.	I am happy with the reward and punishment system where I work	0	18.18	41.82	34.55	5.45

Table 5 shows that the tendency of employees to give a score of 4 on four items, namely 1, 2, 3, and 4. Then, they give a score of 3 on the three item questionnaire statements, 5 and 6. Employees who have the dominant entrepreneur work style in giving explanations and encouraging fellow employees, sharing tasks well, and having good relationships with fellow employees.

3.5. Relationship between Mathematical Thinking Ability and Entrepreneurial Work Style

Based on the results of the Rho Spearman Test stated that there is a significant, strong, and positive relationship between the mathematical thinking ability with an entrepreneur's work style. Based on the percentage of the questionnaire the mathematical thinking ability and the entrepreneurial work style also has a relationship. Consider the following Figure 1 and Figure 2.

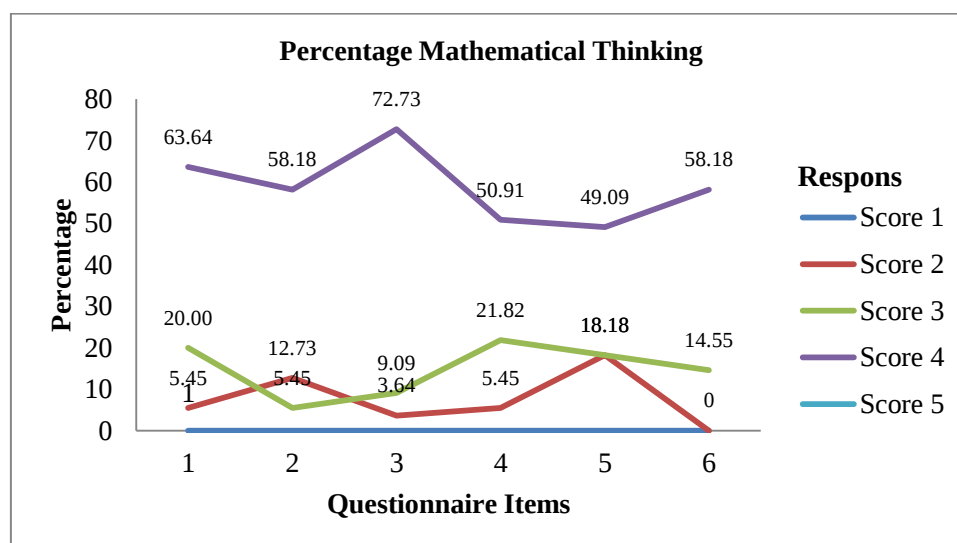


Figure 1. Percentage of Mathematical Ability Questionnaire

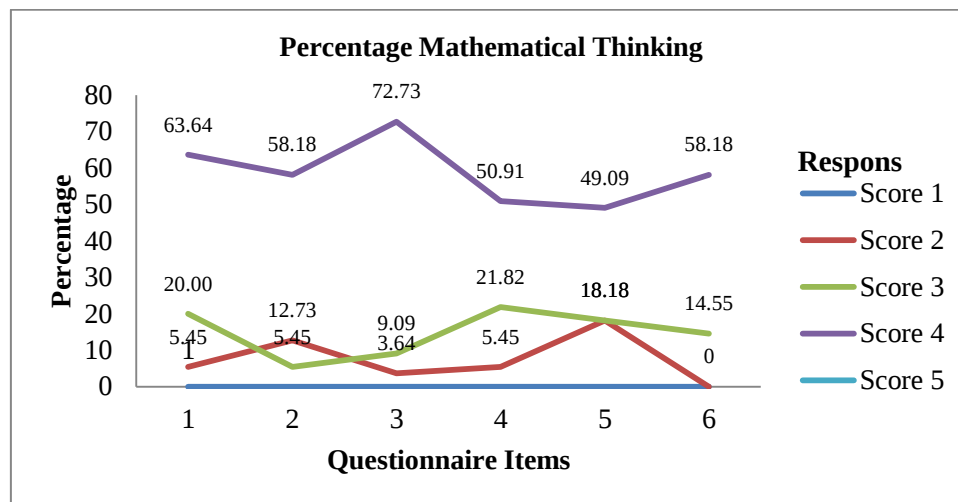


Figure 2. Percentage of Entrepreneurial Work Style Questionnaire

The highest percentage of mathematical thinking in Figure 1 relates to coordination and division of tasks with fellow employees, while the highest percentage of entrepreneurial work styles in Figure 2 relates to providing explanations and encouragement to fellow employees. The relationship that is formed between mathematical thinking ability and entrepreneurial work style, namely employees who can coordinate and share tasks with fellow employees can also provide explanations and encouragement to fellow employees. When connected with the order of percentages on each questionnaire, there is a relationship that employees who are able to complete each job on schedule, can also share the tasks well. According to [10] there is a strong relationship between mathematical thinking and work achievement. Employees who work according to priorities, procedures, and stages and are able to apply the tasks given have a good relationship with fellow employees. Those who can provide explanations and encouragement to fellow employees are brave in expressing their opinions.

4. Conclusion

Based on the data analysis and discussion it can be concluded that there is a relationship between the mathematical thinking ability towards the entrepreneur's work style. Relationships that occur belong to the criteria of strong and unidirectional. The mathematical thinking ability significantly affects the entrepreneur's work style. The better the individual's mathematical thinking ability leads to the better the individual entrepreneur's work style. Mathematical thinking ability in the research subject dominant in score 4, meaning that employee involvement in organizational development can be relied upon. The entrepreneurial work style in the research subject is also dominant in score 4, meaning that the work style of the employee supports in facing organizational challenges in the industrial era 4.0.

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