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# The Effect of Prior Knowledge, Emotional Intelligence and Motivation on Mathematical Communication

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## Abstract

**Purpose:** To examine thoroughly 1) The effect of Prior Knowledge, Emotional Intelligence and Motivation on Mathematical Communication, 2) The effect Prior Knowledge and Motivation concomitantly on Mathematical Communication, 3) The effect of Emotional Intelligence and Motivation simultaneously on Mathematical Communication, 4) The effect of Prior Knowledge, Emotional Intelligence and Motivation at the same time on Mathematical Communication. **Methodology:** This observation rendered as quantitative with correlational-designed observation. The Applied technical data analysis was descriptive statistic, regressive analysis and coefficient multi-correlation with SPSS. **Findings:** The findings of this study were to unfold: 1) Positive and significant effect of Prior Knowledge on Mathematical Communication, was the highest effect. 2) Positive and significant effect of Motivation on Mathematical Communication is the lowest effect. 3) Positive and significant effect of Prior Knowledge and Motivation concomitantly was higher effect than Emotional Intelligence and Motivation on Mathematical Communication. 4) Positive and Significant effects of Prior Knowledge, Emotional Intelligence, and Motivation simultaneously effected on Mathematical Communication. **Significance:** In virtue of the findings result, herewith the researcher proposed a recommendation to the teachers so that always being paying attention upon the three independent variables in time of ongoing learning mathematics because of these three variables when they are maximized at the same time will reinforce Mathematical Communication maximally. To the next researcher may do research concerning motivational consequence to become the least contributor to Mathematical Communication as had been retained in this observation.

**Keywords:** Prior Knowledge, Emotional Intelligence, Motivation and Mathematical Communication

## 1. Introduction

Education is a process of a change of mannerism and behaviour of a person or group of human being in an endeavour of maturity through learning and training. Therefore, the change and development within education should have been analogous to the change in culture and lives. The change in education is when it is implemented augmentation of on all needed capabilities incessantly in anticipating condition to an expected future end. In order

to attain this object is absolutely required of qualified learning material, which might be able to anticipate future development. That one of learning material which crucially is required is the subject of mathematical study.

Mathematics is being considered as a prerequisite subject that should have taken into mastery by the students. because of it is very playing a role in raising learner's mindset. In conjunction with the opinion of Russel (2020) who declared as mathematics is closely related to logic. Logical concepts in mathematics could develop learner's mindset. This thought is analogous to the idea of Gasteigner (2018) who stated that mathematics could have created human resources with critical and analytical minds. Mathematics has been overwhelmed roles in the lives. Mathematics is regarded as a key role in communal industrial development. One of the mathematical roles is as symbolical language which allows a thorough and proper communication, the case in accord with universal objective of learning mathematics as stipulated by NCTM (*National Council of Teacher of Mathematics*) that is to consist solving problem, communicative ability, connective ability, reasoning ability, and representation. Students are expected to work it out to liaise information or caught up in ideas, the defined communication means verbal or non-verbal whereby presenting problems by mathematical language for instance through delivering modelled-presentation (Bina et al.,2021). Talking as reading, listening, discussing, explaining and sharing thoughts meanwhile writing is expounding ideas of mathematics within the real-world phenomena as figured through graphs/picture, tables, algebraic equation, or either in a written word (Ansari, 2018)

Mathematics is being considered as an elusive subject, so many of students are caused to dislike mathematics and try to avert it. This manner is to call forth students' attention who are found lack intrigued to learn mathematics which affected the mathematical learning outcome becomes poor. The poor mathematical learning outcome is coming up to view from the score of PISA (Programme for International Student Assessment) in order to find out of Mathematical ability in Indonesia PISA is a one of international assessment which examines the extent of students' attainment by the age of 15 years in the course of reading, mathematics and science (Baysal & Erkan, 2012). The result study of Programme for International Student Assessment (PISA) 2018 has been released. In virtue of the result of the study the PISA's rank of Indonesia in the year of 2018 turned down when it was compared with the result of PISA in the year of 2015. The study in the year of this 2018 had assessed 600.000 students by the age of 15 years old from 79 countries once in every three years. The category of mathematics of Indonesia was stayed at 7<sup>th</sup> level from the bottom (73) with average score 379 (Tohir, 2019). Indonesia's level was stayed at above of Saudi Arabia which was, having average score 737. And the first rank was still occupied by China which the average score was 591. The intricacy of learning mathematics could be rooted by bothered mathematical teaching learning process as well (Buentello-Montoya et al.,2021). The well-done process of learning-teaching mathematics would have evoked learner's interest and Motivation in learning mathematics which the students are to be more qualified to encounter the difficulties. And then might be rekindled because of mathematics is abstractive. Generally, to begin with mathematics is from concrete until to abstract, from that simple to the complex and from that easy to the very complicated. In learning mathematics should have been figured out the extent of intensity so the matter in learning mathematics might be thoughtfully coped with. There are some too the external factors that substantially giving influence as material subject presentation model, teachers' personality and conduct, learning environment, teachers' competency, vast society mannerism. Reaffirmed by Haser (2022) denoted there is an effect of the application of method, family's economic social status and lack of collaboration between teachers and students on learning mathematics. These factors must have taken into consideration as an objective learning mathematics to attain. The objective learning mathematics is to raise mathematical ability which consists of comprehending concept ability, reasoning ability, communicating ability, solving problem ability. In order to reach this goal, it is necessary to embrace of means and infrastructure to buttress, beside the method and model of learning which are properly performed by teacher. Thus, ought to be kept watch how well learner's Prior Knowledge is to qualify the pattern to render or to teach mathematical material.

In light of the above description that could reason students who think of mathematics is elusive which either leads to learning mathematical result is still found poor because of this diverse factor. The student's aggravation in learning mathematics will surely giving a very effect on the ability of Mathematical Communication. This thing supposed to be evaded in light of mathematics is necessary to develop such ability in the 21<sup>st</sup> century as expounded by Uyen (2021).

Mathematics absolutely is a prerequisite subject that is aptly to foster Communication ability as it is deemed as futuristic required skill (Uyen et al.,2021). Mathematics has a role as symbolical language which is thorough and precise to come true. Mathematics is merely not deemed as a thinking aid but as a Communicational vehicle between students and teachers as well (Tiffany & Surya, 2017).

Mathematical communication is an activity to involve the way to interpret and to bring up mathematical ideas verbally or non-verbally, ability to make sense and accept other mathematical ideas as well conscientiously, analytically, critically, and evaluating to a sheer comprehension (Saputra et al., 2022). Mathematical Communication is defined as:

"An individual's capacity to formulate, employ and interpret mathematics in a variety of contexts. It includes reasoning mathematically and using mathematical concepts, procedures, facts and tools to describe, explain and predict phenomena. It assists individuals to recognize the role that mathematics plays in the world and to make the well-founded judgement and decisions needed by constructive, engaged and reflective citizens." (OECD, 2018, p. 67). Mathematical Communication encompassing the ability: a) to connect real thing, image, diagram into mathematical ideas, b) to describe idea, situation and mathematical relation verbally or non-verbally with real thing, image, graphic and algebra, c) to express daily phenomena in mathematical language or symbol, d) to listen, discuss, and write about mathematics, e) to read comprehensively or to write mathematical presentation, f) to strike conjecture, compile argument, stipulate definition and generalization, g) to define and create questions about learnt mathematics (Cartwright, 2020).

The proper Mathematical Communication will help students to express their mind verbally or non-verbally. Communication ability utterly most important for any activities, particularly in learning activity. By that means students learn how define their perfect mathematical ideas to colleagues, teachers and others (Putra et al.,2020). This means to become the Communication with others more easier working with mathematical presentation between object, symbol and Mathematical Communication is a helpful aid to corroborate students' creativity and motivation in learning mathematics (Tong et al.,2021). The skill of Mathematical Communication is not simply as a means of learning in school, but to enable students as well to affirm, explain, ask questions, and in collaboration to possess a deepened mathematical comprehension. Students have some opportunities to collaborate within group to collect and to present data, to listen of others idea, to discuss together and then is up to a conclusion which becomes an opinion of the group. Students are mainly to learn with communication and to develop their knowledge themselves. Lara-Porras, Rueda-Garcia, & Molina-Munoz (2019) in his study argued about how important it is the Mathematical Communication for a future successful mathematical performance. The skill of Mathematical Communication is importantly utilized in a daily lives due mathematical communication giving sense to student about mathematical role which is of avail in this nowadays of modernized world (Zakkia et al, 2021).

The process of learning mathematical that will crave to reach the ability of Mathematical Communication entails Prior Knowledge. Students' Prior Knowledge is their previous knowledge before taking given learning and this Prior Knowledge is a prerequisite which should have been retained so as student's performed learning process will have a good run. This is in corresponding with the glance of Mulyono (2021) which stated Prior Knowledge is the learners' pre-acquired learning outcome before leaping to a higher knowledge. This Mulyono's outlook is signifying as well that this learners' Prior Knowledge is regarded as prerequisite to attend the learning session so it can be running learning process well. Students' Prior Knowledge is important to be recognized by instructor in order to set the boundary of students' Prior Knowledge ability aptly. Prior knowledge becomes predictor of next mathematical ability (King & Purpura, 2021). Prior Knowledge is a students' bestowed adeptness, therefore teacher should have been aware of the students' readiness in attending learning activity so it may be designed the learning motifs well. Along with mathematics is a basic of diverse sciences and as an organized knowledge hierarchically then students' Prior Knowledge will bring about an effect of success to the next learning session. The students who go through in difficulty on a preliminary subject matter will automatically to face an intricacy to the next step learning well. Prior knowledge by the observation of Simanjuntak (2020) takes an effect on Mathematical Communication. Good Prior Knowledge will bring about Mathematical Communication. Most of

students when attempting to understand the lesson depending on Prior Knowledge which provides a recall to find out an entailed information (Hartati & Indrawati, 2019).

In addition to Prior Knowledge, Mathematical Communication has deliberately been impacted by students' Emotional Intelligence. According to Prafitriyani (2019) Emotional Intelligence is one of a factors that which is giving impact of learner's learning outcome. Due Emotional Intelligence is deemed as an individual capacity to identify and perceive emotion and learners own skill to interact with others (Cui,2021). Yet in order to well interact ought to have well literal ability. Emotional Intelligence has a most prominent part to reach eloquence and effectiveness in literacy, utmost in community (Coesamin et al., 2021). Emotional Intelligence has its own positive part with mathematical thought for emotional state will take an effect into students' performance (Al-Kiyumi & Alfalasi, 2021). Emotional Intelligence is an ability to motivate own self, to subdue frustration, to hold bad impulse, to manage mood, to be empathy and to be cooperative, this intelligence defined as positive character useful to shape strong character and good learning outcome so that Emotional Intelligence is an important means to actuate effectiveness, (Prafitriyani et al., 2019). Emotional Intelligence is a vital endowed necessity, as being the ground requirement as social being to nurture good relationship with others, therefore Emotional Intelligence in realm of education is keenly important to be nourished mostly in today full of vile moral crisis (Hasratuddin, 2018)

Not having Emotional Intelligence will also have a consequence to put down the ability of Mathematical Communication. This case in virtue of the study of Ghamar, Shamsolmolok, & Mohammad (2019) expounded that was found positive and significant relation between Emotional Intelligence and communication skill; they also said that Emotional Intelligence helps an individual to think of more vehement in more better condition and has more effective communication. Goleman (1996) declared that emotion refers to a sense and typical mind, a state of biological and psychological, and a series of tendency to act. Meant someone will be able to communicate well if it is in harmony with good emotion. Otherwise, if someone is in a state of negative emotion, then this thing will cause a disposition to negative means too. Mathematical competency, particularly Mathematical Communication required well emotional sustenance so as Mathematical Communication will be optimally used. Emotional Intelligence indicator alluded to five aspects delineated by Goleman (1996), that is to recognize self-emotion, manage emotion, motivate own self, identify others emotion and to build relationship.

Gleaned from an interview between researcher and a mathematical teacher who affiliated with one of High School Institution, the findings said that the encouragement of Emotional Intelligence in teaching learning was still found poor. Indicated students' Emotional Intelligent classified as poor category, it came to view when presentation conducted there were some students who were not able to under-control themselves, for instance to mess up the class which caused learning material absorption is found not in maximal. In view of (Pritriani, 2021), extracted out of an interview, the students who are poor in Emotional Intelligence as such solving problem senseless, fond of finding fault without resolution, pessimism, egoism, self-oriented, eager to disdain and look down on others, tetchy, bad listener and less empathy, contemptuous debate, temper, and easy frustrate. The difference level of Emotional Intelligence will do an effect into each students' Prior Knowledge.

Rajagukguk (2016) denoted that there is another thing in which is giving an effect to Mathematical Communication that is Motivation. Aqilah, Roza, & Maimunah (2021) in their research found a positive and significant effect of learning Motivation on Mathematical Communication which leads to Mathematical Communication is effected by the value of learning Motivation. Next Rajagukguk (2016) argued that Motivation consists of two that is internal and external Motivation. Internal Motivation is commonly more longer last than external Motivation. Meanwhile external motivation more rapidly evaporated, because of what then let someone to be motivated to learn has disappeared, then students' zeal for learning no longer last as well. The linkage with Mathematical Communication is that if viable learning is gone yet students will get stuck to achieve good Mathematical Communication when learning mathematics.

Otilia (2022) said that motivation is one thing that necessary paid attention in time of learning a certain lesson. Motivation is an internal process that made someone to move forward to reach the goals (Baretto, et al.,2017). Internal Motivation is actuated by satisfaction upon its activity, and it is reachable when students are eagerly to

pursue to carry out homework by their own will or passion which is more mastery oriented (Li et al.,2020). For instance the external factors actuated Motivation for example to accomplish given assignment in order to get renowned, score, and peer acknowledgement, teachers, and parents. Moreon definition of Motivation by Tohidi (2012) is to empower people to reach a high performance and to overcome hindrance in order to change. Motivation is a mover of exercise, control and unflagging in human being behaviour. Motivation could have invigorated one's behaviour, to direct behaviour toward a certain way and to enhance or preserve behaviour. Motivation in learning mathematics it is necessary. Student with high Motivation to learn mathematics is of course will impact his or her commitment to always be determined in learning mathematics. Learning Motivation reveals an important component in learning process, (Laurentius Saptono, et al., 2020).

In virtue of the above exposure assumed that Mathematical Communication is poor, because of the influence of some factors. This case is espoused by the statement of Ikhsan, Pramudia, & Subanti (2020) that at this moment, the extent of Mathematical Communication of students are still classified poor disclosed through when the students are experiencing difficulties in ending up summary in time of solving problem of mathematics and some troubles in expressing mathematical ideas into right symbol and notation. There are some indicated factors which bring about influence to Mathematical Communication that is Prior Knowledge, Emotional Intelligence and Motivation. Therefore, it is necessary the evaluation entreated to those factors, in order to be revealed which factor is most dominant or at least to see that dominantly brought about effect on Mathematical Communication, so that from the evaluation can be made a reference in pedagogical realm which intends to bring up the quality of learning mathematics in school. Evaluation in realm of education and teaching are activity process to dig out information which related to teaching learning end which is gone through by students and then to process or interpret to become in the form of qualitative and quantitative data in corresponding to certain standard (Rajagukguk,2015). The end of this evaluation is required to come up with decisions and or stipulation in realm of pedagogy.

## 2. Methods

This observation took place in a Private Senior High School YPK Medan. The population of survey involved a whole students of 10<sup>th</sup> class. The sample imposed to 10<sup>th</sup> MIA 2 class of 44 students. Methodology of study was experiment. The applied type of this research was quantitative with correlational-designed. Correlational research was intending to know whether or not any relation and effect between two or some variables upon study group as subject. The purpose of this study actually was to describe, explain and scrutinize the effect of Prior Knowledge on Emotional Intelligence and Motivation on the ability of Mathematical Communication individually and in community. The type of this study was in a figure of Quantitative research that is the research which is to involve calculation or number or quantity that intends to recognize the linkage among two or more variables. That relation is a contribution of one variable toward others variable or the relations that in inter-correlative.

To obtain of the empirical data about the observed variable, employed an instrument in a form of tests and questionnaires. The instrument in the form of a test was an instrument of the variable of Mathematical Prior Knowledge ability and calculus learning outcome. The instrument in a form of questionnaire was an instrument of the variable of attitude toward calculus and the Motivation to learn calculus. The development of instrument was run by the following stages, (1) to study the theory which inter-related to the observed variable; (2) to compile dimension and indicator of each variable research; (3) to provide grids instrument; (4) to provide items of questions and set the measurement scale; (5) to run trial error instrument; (5) to examine of each items of questions and validate research instrument.

Prior Knowledge is the students' endowed ability which had hereinafter measured through imposing test about the learnt material. The potency which someone had possessed that related with conceptual mastery, principle, and mathematical abstraction which was reflected in the ability of arithmetic, algebra, geometry, and logic which helpful to understand a concept or in a solving problem. This was acquired from gained score of students that based on Mathematical Prior Knowledge test which consisted from gained mathematical concept before.

Emotional Intelligence is the ability to be able to motivate own self, to overcome the feeling of frustration, to defer bad impulse, manage mood, empathy and collaborative ability, this intelligence is positive character to mould

strong character and a good learning outcome. This thing being gained based on questionnaire about Emotional Intelligence which was filled out by students.

Students' Motivation toward mathematics is a strength or power which was derived from themselves that encompassed encouragement to do something which related with mathematics, interest to deepen material of mathematics, unflagging in learning and passion to be stern learning mathematics. This thing being acquired based on questionnaire about what were students had filled out.

Mathematical Communication ability refers to students' ability is to communicate thoughts or ideas and understand the topic of mathematics through figure, graphic, symbol, table, chart or text that is corresponding verbally and non-verbally, and students' comprehension about mathematics when employing mathematics. Work with mathematical language to deliver ideas verbally and non-verbally accurately, simple and logic. In respect with communication aspect as such is representing, listening, reading, discussing and writing. Regarding this communication ability was obtained from the result of doing test of Mathematical Communication.

Prior Knowledge is the ability that the students possessed as a prerequisite to learn the advance material it is measured through imposing test about learnt material. The potency which someone possessed in related with conceptual mastery, principle and abstraction of mathematics which was reflected in the ability of arithmetic, algebra, geometry, and logic which is helpful to understand a concept or in solving problem. This was acquired from the score gained based on the test of Prior Knowledge which consists of mathematical concepts which was gained before. Prior Knowledge is a positive energy that builds the students' impression (Imam Suyitno, at al., 2019).

Emotional Intelligence is an ability to be able to motivate own self, to overcome the feeling of frustration, defer bad impulse, manage mood, to be empathy and the ability to cooperate; this intelligence is a positive character which is helpful to form strong character and learning outcome. This was acquired based on questionnaire of Emotional Intelligence which was filled out by students.

Students' Motivation upon mathematics is a strength or power which is derived from students' inner themselves which encompassing an impulse to do something that related with mathematics, interest to deepen mathematical material, unflagging in learning and passion to be stern learning mathematics. This was obtained based on questionnaire which was filled out by students.

The ability of mathematical communication refers to students' ability to literate thoughts or ideas and understand the topic of mathematics through picture, graphic, symbol, table, chart or text which are corresponding verbally and non-verbally, and the students should have a comprehension when working with mathematics. Work with mathematical language to deliver ideas verbally and non-verbally, aptly, simple, and logic. In connection with the ability of this communication was acquired from the result of doing the test of Mathematical Communication by students.

Prior Knowledge that is being possessed by students which related to Motivation that is being possessed by students upon mathematics. The more better students' Prior Knowledge on mathematics the more positive will be. Likewise, students' Motivation was impacted by students' Emotional Intelligence. The more better students' Emotional Intelligence then the more better Motivation will be. By a good Prior Knowledge and the good of Emotional Intelligence will drive students be more motivated to learn mathematics so that the ability of students' Mathematical Communication will be better. Thus, might be presumed that Prior Knowledge, Emotional Intelligence, and Motivation will bring about effect to the ability of Mathematical Communication. This is figured as following model.

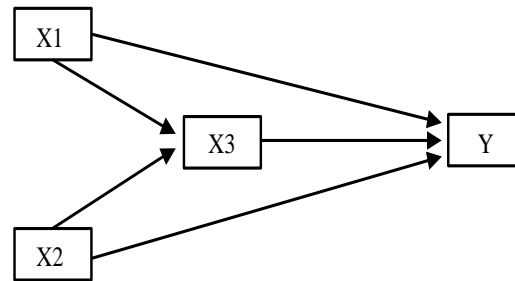


Figure 1: Connectedness Among Variable Research

X<sub>1</sub> = Prior Knowledge

X<sub>2</sub> = Emotional Intelligence

X<sub>3</sub> = Motivation

Y = Mathematical Communication

Technical collecting data employed technical random sampling. Instrument of surveys in a form of 30 items questionnaires of Emotional Intelligence, and Motivation. Then essay test of Prior Knowledge and Mathematical Communication. Before doing with instruments, instrument test had been previously performed for its validity and reliability. Validity test was performed by applying formula *Product moment pearson* and Reliability test was performed by applying cronbach's alpha by means of SPSS. Technical data collection was performed by collecting instrument data of Prior Knowledge, Emotional Intelligence and Motivation which was valid disseminated to students of Senior High School YPK Medan. The data of Mathematical Communication ability was acquired from instrument test result of Mathematical Communication ability which had been handed to students. The applied technical data analysis was descriptive statistic, which comprised the total of the lowest, the highest, average and standard deviation by means of SPSS to explain the effect of Prior Knowledge on Mathematical Communication ability, the effect of Emotional Intelligence on Mathematical Communication ability and the effect of Motivation on Mathematical Communication ability.

Henceforth coefficient multi-correlation with applying SPSS to see how the effect of Prior Knowledge and Emotional Intelligence were concomitantly upon Mathematical Communication ability. The effect of Emotional Intelligence and Motivation simultaneously upon Mathematical Communication ability. Next the effect of Prior Knowledge, Emotional Intelligence and Motivation simultaneously upon Mathematical Communication ability.

### 3. Results

#### 3.1. Descriptive Statistic

The following exhibited table summary of descriptive statistic result, the data about Prior Knowledge, Emotional Intelligence, Motivation and Mathematical Communication.

Table 1: The Summary of Descriptive Statistics Variable Research

	N	Minimum	Maximum	Mean	Std. Deviation
Prior Knowledge	44	36	65	51.07	3.571
Emotional Intelligence	44	41	74	57.77	6.372
Motivation	44	41	79	60.55	9.490
Mathematical Communication	44	38	79	51.30	9.184

From the table 1 above came to view that the total data was of 44. The lowest minimum score coming from Prior Knowledge was 36. Meanwhile the highest was Emotional Intelligence and Motivation with a common score 41. Minimum score of Mathematical Communication was 38 a little bit higher than minimum score of Prior Knowledge. And then for a maximum score which the lowest was Prior Knowledge of 65, the highest was



Motivation and Mathematical Communication was commonly at the number of 79. The lowest average acquired Prior Knowledge data was of 51.07 and the highest was Motivation of 60.55. The lowest standard deviation was Emotional Intelligence with score 6.372 and the highest was Motivation ability with the number of 9.490. Alluded to this information it might be presumed that Prior Knowledge encompassing good category because of the average 51.07 from the maximum score 65. At the mean time Mathematical Communication it is merely obtained in average 51.30 from that maximum score 79. So, this Mathematical Communication could be categorized still in medium category.

### 3.2. Validity and Reliability Test

Validity is measuring what is supposed to be measured (Sumitomo & Widhiarto, 2015). If a test was found valid then that test is *fit* applied to measure what that should be measured. In virtue of that case then the trial of instrumental test was employed (Prior Knowledge and Mathematical Communication) and questionnaire (the ability of Emotional Intelligence and Mathematical Communication) and questionnaire (Emotional Intelligence and Motivation) to seek whether applied instrument had been adapted to measure the ability. The data that had been acquired on trial result, examined by employing SPSS. The end of validity test inferred that the entire question items (4 items questions of Prior Knowledge and 4 items questions of the ability Mathematical Communication) and questionnaire items (30 items questionnaires of Emotional Intelligence and 30 items questionnaires of Motivation) or 68 items were found valid in data collection instrument.

Reliability is the measure by test that is performed to find out consistent result (Sumintorno & Widhiarso, 2015). It meant that the result of students who answered today or tomorrow whether it's consistent or not was found significant difference. Upon reliability test, a whole items of questions and items of questionnaires showed good result, that was being acquired Alpha value of 0.737. This meant overall applied items of questions and items of questionnaires were reliable.

## 4. Normality Test

The acquired data of Prior Knowledge, Emotional Intelligence, Motivation and Mathematical Communication from the result of filling out the surveying test, the normality test examined by applying SPSS, this test functioned as prerequisite to assign which test was properly used to decide hypothesis. Normality test employed with Saphiro-Wilk test, which was executed to see whether normal or not of a data with minor sample (Junita et al.,2021).

Table 2: Summary of Normality Test Variable Research

Variable	Saphiro-Wilk		
	Statistic	Df	Sig.
Prior Knowledge	0.986	44	0.850
Emotional Intelligence	0.955	44	0.083
Motivation	0.956	44	0.087
Mathematical Communication	0.963	44	0.101

From the table 2 above when referring to criteria of examination of Saphiro-Wik which was if Sig. > 0.05 so data was in normal, then it came to view that Prior Knowledge variable data was in normal (Sig. > 0.05 or 0.850 > 0.05). Variable data of Emotional Intelligence was normal because of Sig. > 0.05 or 0.083 > 0.05. Moreover, variable data of Motivation and Mathematical Communication were found normal too because of Sig. > 0.05 or 0.087 > 0.05 and 0.101 > 0.05. Based on the result of normality test due to the four variable data was in normal distributed, then the technical data analysis employed regression test and correlation it might be continued.

## 5. Homogeneity Test

The following table of homogeneity test result from Prior Knowledge, Emotional Intelligence, Motivation and Mathematical Communication with Lavene Test employing SPSS:

Table 3: Homogeneity Test Result Variable Research

	Levene Statistics	df1	df2	Sig.
Data Based on Mean	1.439	3	172	0.233

On the table 3 above its explicitly came to view that a whole variable data research was homogeneous or derived from the same population. This was because of referring to criteria of homogeneity test with Levene that homogenous data if Sig. > 0.05 is  $0.233 > 0.05$ .

## 6. Regression and Correlation Test

After doing prerequisite test as of normality test and homogeneity test (though this test not as absolute precondition before doing parametric test but it's necessary to unveil whether data was derived from the same population. Hypothesis test was executed with regression and correlation test employing SPSS. From the table below explicitly revealed how was the effect of Prior Knowledge on Mathematical Communication ( $X_1$  to Y), Emotional Intelligence on Mathematical Communication ( $X_2$  to Y), Motivation on Mathematical Communication ( $X_3$  to Y):

Table 4: Analysis Summary  $X_1$  to Y,  $X_2$  to Y,  $X_3$  to Y

Model	Correlation	Anova	Regression		
	R	Sig.	Constant	Coefficient	Sig.
$X_1$ to Y	0.823	0.000	24.204	0.650	0.000
$X_2$ to Y	0.648	0.000	48.252	0.367	0.000
$X_3$ to Y	0.407	0.006	53.591	0.235	0.000

From the table 4 above could be formulated  $X_1$  to Y the regressive equation was  $Y = 24.204 + 0.650X_1$ , Sig. < 0.05 viz.  $0.000 < 0.05$  upon Anova test this thing was to appoint that regressive equation acquired from regression test which was good to be applied. Value R pointed Prior Knowledge contribution on Mathematical Communication was 82.3%. Afterward for  $X_2$  to Y its regressive equation  $Y = 48.252 + 0.367 X_2$  from Anova test this regressive equation was good because the value of Sig. < 0.05. Value R appoints Emotional Intelligence contribution on Mathematical Communication of 64.8%. The last,  $X_3$  to Y has regressive equation  $Y = 53.591 + 0.235X_3$ . This regressive equation was good in light of Anova test result Sig. < 0.05 viz.  $0.00 < 0.05$ . Motivation contribution on Mathematical Communication is 40.7%.

The analytical result of Prior Knowledge and Motivation on Mathematical Communication ( $X_1$  and  $X_3$  to Y) with Emotional Intelligence and Motivation on Mathematical Communication ( $X_2$  and  $X_3$  to Y) is exhibited on table below:

Table 5: Analysis Summary  $X_1$  and  $X_3$  to Y with  $X_2$  and  $X_3$  to Y

Model	Correlation	Anova	Regression			Sig.
	R	Sig.	Constant	Coef $X_1$ and $X_2$	$X_2$ and $X_3$	
$X_1$ and $X_3$ to Y	0.890	0.000	10.754	0.627	0.196	0.038
$X_2$ and $X_3$ to Y	0.794	0.000	26.457	0.387	0.266	0.000

From the table 5 above assumed for  $X_1$  and  $X_3$  to Y its regressive equation  $Y = 10.754 + 0.627 X_1 + 0.196 X_3$  from this test of Anova regressive equation was good as well because of the value Sig. < 0.05. The value R indicated the contribution of Prior Knowledge and Motivation simultaneously on Mathematical Communication of 89%. Moreover,  $X_2$  and  $X_3$  to Y has regressive equation  $Y = 26.457 + 0.387X_2 + 0.266 X_3$ . This regressive equation

was good too in light of Anova test result Sig. < 0.05 viz.  $0.00 < 0.05$ . The contribution of Prior Knowledge and Emotional Intelligence simultaneously on Mathematical Communication of 79.4%.

The effect of Prior Knowledge, Emotional Intelligence and Motivation concomitantly on Mathematical Communication, as demonstrated on the table below:

Table 6: Analysis Summary  $X_1$ ,  $X_2$ , and  $X_3$  to Y

Model	Correlation	Anova		Regression			Sig.
	R	Sig.	Constant	$X_1$	$X_2$	$X_3$	
$X_1$ , $X_2$ and $X_3$ to Y	0.910	0.000	10.012	0.484	0.150	0.217	0.036

From the table 6 above assumed  $X_1$ ,  $X_2$  and  $X_3$  to Y its regressive equation was  $Y = 10.012 + 0.484X_1 + 0.150X_2 + 0.217 X_3$ , Sig. < 0.05 viz.  $0.000 < 0, 05$  upon Anova test this thing was simplified that regressive equation which was acquired from regression test was good and it was applicable. Value R appoints the contribution of Prior Knowledge, Emotional Intelligence and Motivation concomitantly on Mathematical Communication was 91%.

## 7. Discussion

From the analysis result of the test of significance and regression to detect how the effect of Prior Knowledge on Mathematical Communication was displayed whether the influence was positive and significant among Prior Knowledge variable on Mathematical Communication. The Sig. which was acquired on regression test was  $0.000 < 0.05$ . The value of its coefficient determination was 0.823 which signified that the effect of Prior Knowledge on Mathematical Communication was 82.3%. This finding was synchronized with the research of Simanjuntak (2020) which magnified there is a positive relationship and the effect of Prior Knowledge on Mathematical Communication.

From the next analysis, obtained positive and significant effect among Emotional Intelligence variable on Mathematical Communication. This was verified from the regressive calculation with Sig. =  $0.000 < 0.05$ . Coefficient determination value was 0.648 which said that substantial effect of Emotional Intelligence on Mathematical Communication was 64.8%. In accord with the research of Cui (2021) and Coesamin (2021) that stated it was found direct significant effect among Emotional Intelligence on Mathematical Communication.

Furthermore, in light of regression analysis result and correlation it was verified that discovered a positive and significant effect among Motivation variable on Mathematical Communication because of Sig. obtained  $0.000 < 0.05$  and coefficient determination value 0.407 which said the substantial Motivation effect on Mathematical Communication was 40.7%. This case was corroborated by the research of Georgeta (2021) and Aqilah, Rosa, & Maimunah (2021), which also found that Motivation affecting Mathematical Communication, Motivation as a main key within Mathematical Communication. From the three analysis the effect of each Prior Knowledge, Emotional Intelligence and Motivation on Mathematical Communication the most enormous of its coefficient determination was Prior Knowledge was of 0.678. This meant that 67.8% of contribution of Prior Knowledge took an effect on Mathematical Communication. Meanwhile the least contribution was derived from Motivation with coefficient determination 0.407 or is of 40.7% the effect on the ability of Mathematical Communication.

Hence in virtue of the analysis of collaboration effect between two independent variables on dependent variable it's found the positive and significant effect between Prior knowledge and Motivation simultaneously on the ability of Mathematical Communication. This was proven out of the result of Sig Regressive Test, that was  $0.038 < 0.05$ . The value of coefficient determination was of 0.890, which stated that the substantial effect of Prior Knowledge and Motivation were simultaneously on Mathematical Communication was of 89%. This variable connection when in aggregate as Erlin (2017) declared that Mathematical Communication is connected with cognitive and psychometric aspect. So, if there was found collaboration between cognitive aspect and psychometric such as Prior Knowledge and Emotional Intelligence therefore would be more effectual on the ability of Mathematical Communication.

Emotional Intelligence and Motivation are simultaneously having a positive effect on Mathematical Communication. It was verified by the result  $\text{Sig. } 0.000 < 0.05$ . Coefficient determination value was 0.794 which signified this variable at the same time giving an effect 79.4% on Mathematical Communication. Collaboration between two dependent variables that which were most impacting the ability of Mathematical Communication was the collaboration between Prior Knowledge and Motivation were of 89%. Meanwhile the collaboration which gave the lowest contribution was the collaboration between Emotional Intelligence and Motivation simultaneously were giving the effect of 79.4% on the ability of Mathematical Communication.

And then in light of the analysis of the effect of collaboration between three independent variables toward dependent variable found a positive and significant effect of Prior Knowledge, Emotional Intelligence and Motivation on Mathematical Communication simultaneously, with contribution 91%. The evaluation from this overviews result were the variables which mostly impacting Mathematical Communication was Prior Knowledge of 82.3%. Meanwhile the variable of the least its contribution or its effect on Mathematical Communication was Motivation of 40.7%. Nonetheless, if Motivation was connected with Prior Knowledge the contribution rendered toward Mathematical Communication it's far more higher that was 89%. Though if two variables were connected then the greatest contributor on Mathematical Communication simultaneously were Prior Knowledge and Emotional Intelligence were of 79.4%. The most enormous factor which was impacting the ability of Mathematical Communication if it's done simultaneously was the fusion between Prior Knowledge, Emotional Intelligence and Motivation were of 91%. From this result of evaluation might be summed up that Prior Knowledge is the ability which is most contributive on the ability of Mathematical Communication. This idea was corroborated by Putri (2020) who said that if Prior Knowledge is high then the ability of Mathematical Communication is high as well.

In virtue of this findings that Prior Knowledge was very influential on Mathematical Communication how much more if it's combined with students' learning Motivation. Whilst Motivation is only penetrating more less influence toward the ability of Mathematical Communication, but if it's combined with Prior Knowledge would give the greatest contribution on Mathematical Communication. Though Emotional Intelligence was rendering effect which great enough of 64.8% on Mathematical Communication ability but if it's combined with Prior Knowledge and Motivation they only add up a little bit were 2%. This was certainly caused of contribution that had been great from Prior Knowledge and Motivation on Mathematical Communication ability of 89% it is no longer prevailing any great effect again.

## 8. Conclusion

The data had been gone through analysis, then the reviews were taking place upon the test result of descriptive statistic, regression and correlation, so the conclusion extracted as:

1. Found positive and significant effect among Prior Knowledge on Mathematical Communication with substantial effect of 82.3%
2. Found positive and significant effect among Emotional Intelligence on Mathematical Communication with substantial effect of 64.8%
3. Found positive and significant effect among Motivation on Mathematical Communication with substantial effect of 40.7%.
4. Found positive and significant effect between Prior Knowledge and Motivation at the same time on Mathematical Communication with substantial effect of 89.2%.
5. Found positive and significant effect between Emotional Intelligence and Motivation simultaneously on Mathematical Communication with substantial effect of 79.4%.
6. Found positive and significant effect between Prior Knowledge, Emotional Intelligence and Motivation concomitantly on Mathematical Communication with substantial effect of 91%.

In virtue of the findings result expounded above, herewith the researcher proposed a recommendation to the teachers so that always being paying attention upon the three independent variables in time of ongoing learning mathematics because of these three variables when maximized at the same time will reinforce Mathematical

Communication maximally. To the next researcher may do research concerning motivation consequence to become the least contributor on Mathematical Communication as being retained in this observation.

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