LEARNING PROCESS CONTROL MTsN 1 MEDAN

Titin Rahmayanti Rambe[1], *Fasti Rola*[2], *Siti Habsari Pratiwi*[3], *Anggili Pratama*[4], *Jhohas Dongoran*[5], *Hasratuddin*[6]
[1,2,3,4,5] *DoctoralStudent at Medan State University*
[6]*Doctoral Lecturer at Medan State University*
[1]*e-mail:titinrahmayanti@stkipalmaksum.ac.id*
[2]*e-mail:fastirola@usu.ac.id*
[3]*e-mail:shihabpratiwi@iainlangsa.ac.id*
[4]*e-mail: anggilipratama@gmail.com*
[5]*e-mail: dongoran231089@gmail.com*
[6]email:siregarhasratuddin@yahoo.com

Abstract. Abstract. The purpose of this study is to analyze whether the product produced by the process meets the initial expectations or meets the standards expected beforehand. The learning process is one that must be tested for execution and outcomes to ensure that the outputs meet the objectives and are of the appropriate quality. It would be very interesting to evaluate and explain the original incident on the basis of the authentic data collected, as well as how to present that data to interested parties and how the data is processed using appropriate statistics; this will give us an idea of how a process occurs. Therefore, the sample for this study consisted of valid National Exam (NE) results data for MTsN 1 Medan students from the academic year 2013/2014 to 2017/2018 in four subjects (Indonesian, English, Mathematics, and Science). The results of the study showed that the learning process that took place at the Medan MTSN 1 school in the academic year 2013/2014 to 2018/2019 went smoothly.

Keywords : Control, process, learning, NE, Medan

Introduction

The multivariate statistical approach is an analytical methodology that considers the correlation of a set of correlated criterion variables as a system. Researchers can use multivariate analysis to solve more generic or difficult issues, as well as challenges that more properly mirror the actual world. One of the goals of multivariate analysis is to discover and explain the underlying structure or properties of the data. Multivariate analysis is also used to find new variables that are less in number than the original variables but may explain fluctuations in the original variables.

The control analysis of MTSN 1 Medan's learning processes and results is discussed in this article. The purpose is to establish if the product generated by the process satisfies its initial expectations or continues to satisfy the expected standards or original design for which it was built. The learning process is one that must be monitored for execution and results to ensure that the outputs fulfill the objectives and are of appropriate quality.

It would be fascinating to explore the real occurrence of legitimate data, how to establish the data's significance, and how to analyze the data using relevant statistics to demonstrate how the process works in this context. As a consequence, valid student National Exam results (MTSN 1 Medan 2013/2014-2017/2018) are used in four courses (Indonesian, English, Mathematics, and Science).

How may multivariate statistical approaches be used to investigate the links and interrelationships between the topics of Indonesian (IND), English (ING), and Science with Mathematics (MAT)? What are the consequences of the continuing learning process control? The goal of this article is to investigate and describe the relationships and connections between the subjects covered in the National Examination, as well as to provide interested parties with information on how to achieve learning process control results in MTsN 1 Medan by using multivariate statistical methods.

Result and Discussion

The sample for the analysis in this article is students' National Examination (MTsN 1 Medan 2013/14-2017/18) results in four disciplines (Indonesian, English, Mathematics, and Science). Over the course of five years, the total number of data points on student scores from 1,734 people was discovered to be distributed as follows: in 2013/2014, there were 294 people; in 2014/2015, there were 308 people; in 2015/2016, there were 378 people; in 2016/2017, there were 355 people; and in 2017/2018, there were 399 people.

The data analysis in this paper focuses on 1) the relationship between Indonesian, English, mathematics, and science training. The author chose the 2013/2014 implementation year because he wanted to investigate and disclose more linked themes. The author chose the 2013/2014-2017/2018 National Examination with Indonesian, English, Mathematics, and IPAs for the whole five-year period. 2). Concerning the control of the five-year learning process, the UN value data is sent through the control model *UperControlLimit*(UCL),

Data Analysis for 2013/2014

This section analyzes actual data from IndonesiaMTsN 1 Medanin 2013/2014 test results, especially four subject tests: Indonesian (X1), English (X2), Mathematics (X3), and Science (X4), with a total of 294 pupils. We acquired the following results by calculating the average of each: The following results were obtained from calculating the average of each:

Table 1. Average of Four Subjects in Comparison

SUBJECT	ENG	ING	MATT	IPA
Jl	2405,400	2586,500	2414,300	2451,000
Means	8,182	8,798	8,212	8,337
Var	0.862	0.279	1,111	0.723
Range	4,300	3,800	4,700	4,200

Source: results of data processing by researchers, 2022

Based on the analytical results in Table 1, the assumption is that the data is normally distributed and that the learning is done by the same teacher. The highest average score in English (ING) courses was 8.798; the lowest average score in Indonesian (IND) subjects was 8.182. This demonstrates that the English subject has the highest student accomplishment, whereas the Indonesian language subject has the lowest.

This section examines actual data from IndonesiaMTSN 1 Medanin test results from 2013/2014, especially four subject tests: Indonesian (X1), English (X2), Mathematics (X3), and Science (X4), with a total of 294 pupils. We acquired the following results by calculating

the average of each: The following results were obtained from calculating the average of each:

To see the relationship or correlation between topics, the following correlation matrix calculation results are presented:

Table 2. Matrix of Variance-Covariance Correlation

BIND	**1.0000**	0.2185	0.2952	0.1256
BING	0.2185	**1.0000**	0.3581	0.3487
MATE	0.2952	0.3581	**1.0000**	0.2867
IPA	0.1256	0.3487	0.2867	**1.0000**
	ENG	**ING**	**MATT**	**IPA**

Source: results of data processing by researchers, 2022

The connection between English (ING) and mathematics (MAT) topics has the greatest value of 0.3581, while the correlation between IND and science subjects has the lowest value of 0.1256, according to the study shown in Table 2. This suggests that the strongest relationship between disciplines is between English and mathematics, whereas the poorest link is between Indonesian and science. When the whole correlation value is taken into account, the correlation value is positive. This proves that pupils do admirably in all courses.

The following are the results of constructing the inverse correlation matrix to see which topics can best predict other subjects.

Table 3. Matrix of Inverse Correlation

ENG	1.1153	-0.1351	-0.2813	-0.0124
ING	-0.1351	1.2657	-0.3283	-0.3314
MATT	-0.2813	-0.3283	1.2660	-0.2135
IPA	-0.0124	-0.3314	-0.2135	1.1788
	ENG	**ING**	**MATT**	**IPA**

Source: results of data processing by researchers, 2022

Each diagonal member of the inverse correlation matrix is proportionately connected to the correspondence variable specified by regression, according to the study shown in Table 3. Each diagonal element is obviously equivalent to to$\frac{1}{1-R^2}$,, where R is the multicorrelation coefficient between the other variables. According to the aforementioned computation, the greatest percentage value for MAT classes is 21% ($\frac{1.2660-1}{1.2660}$), while the lowest percentage value for IND classes is 10.3% ($\frac{1.1153-1}{1.1153}$). This means that MAT is the topic most anticipated by other subjects, whereas IND is the subject least predicted by other subjects.

The results of the predictive analysis of subject values using regression analysis, $.\hat{Y} = EY + cov(Y,X).var(X)^{-1}(x - EX).$

1. The magnitude of the expected value provided by each Indonesian value to the value of mathematics is is$\hat{Y}_{MAT} = 5{,}471 + 0{,}335X_{BIN}$

Table 4. Indonesian Language Scores on Mathematics Scores Coefficient

Coefficientsa						
Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	std. Error	Beta		
1	(Constan)	5,471	.523		10,470	.000
	BIND	.335	063	.295	5,279	.000
a. Dependent Variable: Mathematics						

2. The magnitude of the anticipated value provided to the math score by each English score is$\hat{Y}_{MAT} = 1{,}924 + 0{,}715X_{ING}$

Table 5. English Scores on Mathematics Scores Coefficient

Coefficientsa						
Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	std. Error	Beta		
1	(Constan)	1924	.961		2001	046
	BING	.715	.109	.358	6,553	.000
a. Dependent Variable: Mathematics						

3. The magnitude of the expected value for the value of Mathematics supplied by each value of Indonesian (IND), English (ING), and IPA is$\hat{Y}_{MAT} = 5{,}250 + 0{,}355X_{IPA}$

Table 6. Coefficient of Natural Science Scores on Mathematics Values

Coefficientsa						
Model		Unstandardized Coefficients		Standardized Coefficients	Q	Sig.
		B	std. Error	Beta		
1	(Constant)	5,250	.582		9017	.000
	IPA	.355	.069	.287	5.113	.000
a. Dependent Variable: Mathematics						

4. The magnitude of the predicted value given by each value of Indonesian (IND), English (ING), and IPA for the value of Mathematics is$\hat{Y}_{MAT} = 0{,}008 + 0{,}248X_{BIN} + 0{,}500X_{ING} + 0{,}213X_{IPA}$

Table 7. Coefficient of IND, ING, IPA Values on Mathematical Values

Coefficientsa						
Model		Unstandardized Coefficients		Standardized Coefficients	Q	Sig.
		B	std. Error	Beta		
1	(Constant)	008	.992		008	.994
	SON	.248	061	.219	4,070	.000
	ING	.500	.114	.250	4,396	.000

IPA	.213	.069	.172	3,070	002
a.**Dependent Variable: Mathematics**					

Learning Process Control Analysis

The data utilized for analysis in this topic runs from 2013/2014 to 2017/2019 for the subjects of Indonesian, English, Mathematics, and Science on national exam scores.MTsN 1 Medan. The first stage of process control analysis is to determine the determinant value of the covariance matrix, and the following data are obtained:

Table 8. Determinants of the Covariance Matrix and UCL Values

Year	MDK0	UCL2	UCL3
2013/2014	0.128366	44.62798	99.86698
2014/2015	3.680986	44.62798	99.86698
2015/ 2016	17.2321	44.62798	99.86698
2016/ 2017	1.01308	44.62798	99.86698
2017/ 2018	1.675714	44.62798	99.86698

Source: results of data processing by researchers, 2022

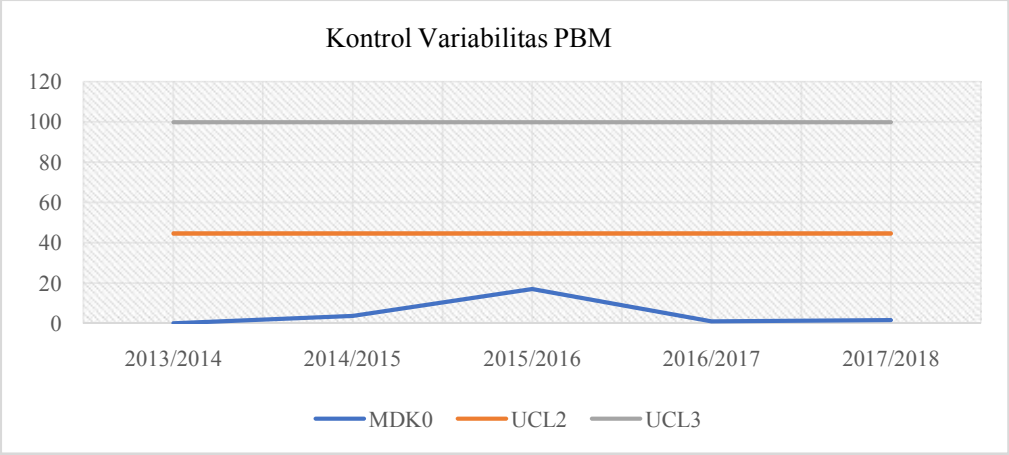

Figure 1. PBM Variability Control

Table 9. Values – Chart for Future Sub Samples Means and UCL ValuesT^2

Year	T^2	UCL2	UCL3
2013/2014	78,459	223.1399	499.3349
2014/2015	74019	223.1399	499.3349
2015/ 2016	24,564	223.1399	499.3349
2016/ 2017	24,862	223.1399	499.3349
2017/ 2018	24.76	223.1399	499.3349

Source: results of data processing by researchers, 2022

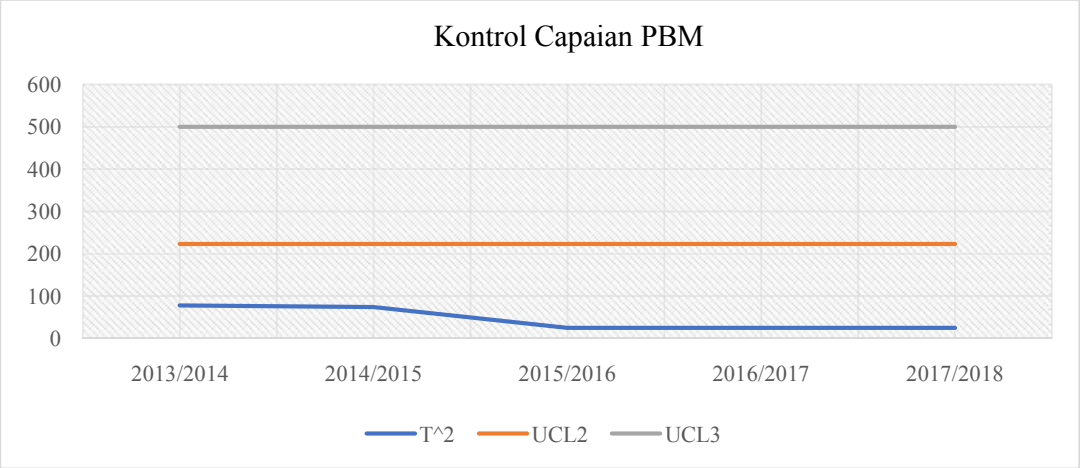

Figure 2. Variability Control of PBM

Both the variability control lines and the process achievement control lines (T2) are below the UCL(2) and UCL(3) lines, according to the examination of the preceding tables and figures. This shows that the learning process has been running efficiently during the last five years in accordance with the learning outcomes provided. Thus, without lowering the amount of time variables required, the National Examination score data from 2013/2014 to 2017/2018 may be used as a controller for the learning process. From the graph above, it can be concluded that the learning process that took place at the MTSN 1 Medan school for the 2013/2014 school year to 2017/2018 went smoothly as expected.

Conclusion

1. In general, the highest average student achievement score in the four subjects, namely Indonesian, English, Mathematics, and Natural Sciences, which were in the 2013/2014 National Examination in MTs N 1 Medan, is 8.798 in the English (ING) subject, with a smaller standard deviation of 279; the lowest average student achievement score was 8,182 in Indonesian (IND) lessons, with a standard deviation of 0.862.
2. The weakest subject correlation, with a magnitude of 1256, is between Indonesian and IPA.The strongest correlation between these subjects, with a magnitude of 0.3581, is between English and mathematics.Indonesian and English have little or no correlation, as do Science and Mathematics.However, when the overall correlation value is considered, the data shows a positive correlation value.
3. Mathematics is the subject most predicted by other subjects (21%), while Indonesian is the least predicted (10.3%).
4. One subject's estimated value for another lesson (assuming there are no predictable lesson provisions). The results of the regression analysis used to forecast subject value,.$\hat{Y} = EY + cov(Y, X).var(X)^{-1}(x - EX)$
   a) The magnitude of the expected value provided by each Indonesian value to the value of mathematics is$\hat{Y}_{MAT} = 5{,}471 + 0{,}335X_{BIN}$
   b) The magnitude of the anticipated value provided to the math score by each English score is is$\hat{Y}_{MAT} = 1{,}924 + 0{,}715X_{ING}$
   c) The magnitude of the expected value assigned by each scientific value to the mathematical value is$\hat{Y}_{MAT} = 5{,}250 + 0{,}355X_{IPA}$

d) The magnitude of the expected value provided to the value of mathematics by each BIN, ING, and IPA value is is$\hat{Y}_{MAT} = 0{,}008 + 0{,}248X_{BIN} + 0{,}500X_{ING} + 0{,}213X_{IPA}$

5. Based on the seven years of National Examination score data examined, from 2013/2014 to 2017/2018, both the variability control lines (MDKov) and the PBM achievement control lines (T2) are lower than the UCL(2) and UCL(3) lines. This shows that the learning process has been running efficiently during the last five years in accordance with the learning outcomes provided. Thus, without lowering the amount of time variables required, the National Examination score data from 2013/2014 to 2017/2018 may be used as a controller for the learning process.

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