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BEHIND THE CHANGE OF THE NATIONAL EXAMINATION POLICY IN INDONESIA

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Abstract

This study aimed to find out the mapping of difficulties in mathematics National Examination (NE) in Senior High School along with changes in NE policy in Indonesia in the last 10 years. Researcher conducted descriptive explorative analysis to find out the scope of material, the absorption, and mapping the difficulties faced by students in mathematics. Data analysis carried out by examining the data of each material and indicators. It grouped into two, namely low (<50%) and high absorption (≥ 50%). The results showed that the overall absorption of the NE had decreased significantly over the past 5 years (2013 to 2017). There did not find out of difficult material before implementation of Curriculum 2013. However, the last 5 years (after the period of implementation Curriculum 2013) have found several difficulties. Moreover, since 2015, almost all the materials on mathematics NE were categorized as difficult after the changing in the status of the NE (not a determinant factor of students' graduation) and implementation the computer-based test. The difficult materials were probability, geometry transformations, space geometry, calculus, circles, linear programs, and statistics. Generally, the difficulties were in narrative problem-solving questions or using real-world contexts. Also, the results showed non-cognitive impacts (students' motivation) as the result of the policy changing, especially the status and technical implementation of the NE.

Keywords: national examination policy, mathematics, senior high school.

INTRODUCTION

Evaluation is an important aspect to the improvement of education. The success of education and the quality of the education implementation can be reflected in the results of the evaluation. Ebel and Frisbie (1991) stated that the objective of the evaluation is to determine the students' achievement. Therefore, a benchmark of educational success is seen from the students' achievement. If the evaluation results show a good students' achievement; means that the implementation of an education program has a positive impact. In the other hand, if the evaluation results show a low of students' achievement; means that there are problems in the implementation of education. Here, it needs to review the implementation of education.

Evaluation of primary and secondary education in Indonesia is regulated in Government Regulation No. 19 of 2005. In the regulation, evaluation of primary and secondary education is performed by teachers, educational institutions, and government (regulation number 19 of 2005). The evaluation aims to find out the students' learning outcome of mathematics learning in the class. The learning outcome might be the mastery of concepts or skills. Because the evaluations are limited to one or several classes, then the results of evaluations performed by the teacher can only be used to determine the successes or difficulties faced by a group of students in a class. Meanwhile, the evaluation is performed by the educational institution

through final school examinations aiming to find out the success or difficulties of students in one school. Furthermore, a national-scale education evaluation conducts to find out the success or difficulties of students nationally. Evaluations on the national scope are performed by the government through ministries or national education standard board (BSNP). In addition, aiming to know the successes or difficulties faced by the students, the evaluations on a national scope are also used as material to improve the curriculum or generate other education policies (Nitko & Brookhart, 2011).

A form of national-scale education evaluation in Indonesia is through the national examination (NE). There are gradual changes in government policies regarding this NE, such as changes in names, changes in graduation criteria, and changes in technical implementation. A national-scale education evaluation has been held in Indonesia since 1965 with the name "Ujian Negara" or state examination. After that, in 1972-1979, the implementation of the evaluation was no longer held by the central government, but the implementation was conducted by the school or school group and called as "Ujian Sekolah" or school examination. A national level evaluation was held from 1982 to 2002 and called as "EBTANAS" or a national learning evaluation. Furthermore, in 2003, there a changing become "UAN" or national final exams, and it was implemented until 2004. The latest changes were made in 2005, namely "UN" or national examinations.

In the beginning, the result of the NE is the first indicator for a student graduation. If a student meets the standards or criteria, then the students are declared as graduated and they can continue to a higher level of education. Criteria for student graduation from year to year also changes. For example, in 2005, the government determined the graduation based on two criteria, namely the minimum score for each subject and a minimum average score for all subjects. In 2005, the scores on each subject and the minimum average of all subjects were 4.25. In 2006, the minimum score for each subject was 4.25, but the minimum average of all subjects was increased to 5.00. In 2007, the minimum score of each subject and the minimum average score were 5.00. The minimum average score determined by the government in the following years continued to increase until 2014 (the implementation of the Curriculum 2013) which reached 5.50, while the minimum score for each subject decreased to 4.00 in 2014. In 2015 to today, the government issued a new policy by giving mandates to each school to determine the graduation of students. In this case, the results of the NE are no longer used as an indicator of student graduation.

Not only on indicators of graduation but also there changed in the technical implementation of the NE. Until 2014, the examination was paper-based test (PPT). Meanwhile, in 2015, several schools had implemented a computer-based test (CBT). In 2016 and 2017, most of the schools have implemented computer-based national exams. Although there were various problems in the implementation of the CBT (Retnawati, Hadi, *et al*., 2017), the government attempts to improve and set a target in which all students could take part in a computer-based NE in the next years.

As a follow-up to the implementation of national-level evaluations, the data and evaluation tools can be used as material in improvements and planning in the curriculum (Goodson-Espy *et al*., 2014; Saylor, 1974). The tools and data of evaluation on the NE might use to obtain information. Some previous study used the evaluation tool, the question in the

tasks of the NE to obtain information of the characteristics of the National Exams questions (Farhan & Retnawati, 2014; Huriaty & Mardapi, 2014; Isgiyanto, 2012; Kartowagiran, 2008; Retnawati, 2014). Moreover, the questions also use as a reference in designing similar questions and use in measuring the students' competencies (Azis & Sugiman, 2015). There are also researchers who use the data of NE result to find out the students' characteristics who participated in the NE (Prayitno, Nurjana, & Khasanah, 2017; Rumasoreng & Sugiman, 2014; Tias & Wutsqa, 2015), or to made the clusters of the school in an area (Rosa & Gunawan, 2015).

The evaluation data that might use in the research are the report of the NE score published by the national education standard board (BSNP), the ministry of education and culture. The report of NE over the last 10 years can use to determine the development of the absorption and to find out the problems faced by students in the NE. Absorption of NE is the percentage of students who answer correctly to the material, or a scope of material tested in the NE. Unfortunately, the report published by the BSNP has not been fully used for research purpose. A study by Lumapow (2012) found out the difficulties of students in the NE using the absorption of the NE in which BSNP report as the main data source. However, the data of the research is limited to 3 years (2007 to 2010). Then, it impacts the information in the conclusion that is still limited only on the period of 3 years. In fact, in the past 10 years, there have been several policies changing toward the implementation of education in Indonesia (as previously described). Therefore, the study tried to find out what happened behind the changes in NE policy in Indonesia through re-analyzing the absorption data of the NE in the last 10 years.

The data of absorption obtained from the report of NE used to determine the material tested at the NE in the period of 2008 to 2017 and find out how the development of the absorption along with the occurring of policy changing. This study also sought to map the difficult of mathematical materials in the period of 2008 to 2017, as well as finding out the difficulties. The researchers also documented the questions of the tasks used in the period of 2008 to 2017 aimed to support the analysis results and find out more in detail the difficulties faced by students.

METHOD

This research used a quantitative approach through an explorative descriptive analysis of the absorption on the mathematics subjects of NE at Senior High School. The data were from the NE report published by BSNP (Balitbang Kemdikbud RI, 2008, 2009, 2010, 2011, 2012, 2013, 2014, 2015, 2016, 2017). In the report, the data presented were annual NE results consisting of 3 levels (junior high school / islamic junior high school, senior high school/islamic senior high school, and vocational high school). The data divided into several types, namely statistics (mean, standard deviation, maximum and minimum scores), list (school ranking, or province), absorption (based on SKL, material, indicators, and items), and the graph of the score distribution. For the purposes of data analysis, researchers documented the absorption on NE results based on indicators of the mathematics subject in senior high school of science in the period of 2008 to 2017.

Analysis carried out on the indicators of mathematical material in the NE in the period of 2008 to 2017. The indicators of material grouped based on the material,

and the type of ability. Aiming to determine the development of the absorption in the NE, the absorption of each material and the material indicator was mapped into two, namely absorption <50% and absorption ≥50%. The absorption which is less than 50% is categorized as difficult, and absorption which is more or equal to 50% is categorized as not difficult (easy). Furthermore, the absorption of each competency indicator on each year also mapped which aimed to find out the difficulties in each material more clearly. In addition, the researchers also documented the questions of the task in the period of 2008 to 2017 which aimed to capture the types of difficult questions and find out the cause of the difficulties.

The analysis results of the absorption data were also associated with the policy changes as highlighted in this study. The policy as the focus of the study was curriculum changing, changing in the technical implementation of the NE, and changes in the status of the NE. The analysis result of absorption presented separately for each year to find out the influence of the policy, especially in the low of absorption data.

FINDINGS AND DISCUSSION

Based on the analysis results toward the material tested at the NE at a senior high school in the period of 2008 to 2017, it obtained 19 materials in the mathematics subject for the last 10 years. Of the 19 materials, there are 6 mathematical materials that do not appear every year. The materials are algebra, mathematical logic, vectors, probability, polynomial, combinatorics, and composition and inverse functions. Mathematical and vector logic materials were not tested in the last 2 years in the NE. Meanwhile, the probability and polynomial materials were not tested in 2017. On the other hand, there were 5 materials that always appeared in the NE with more than 3 times, and even 10 times. The materials are calculus, trigonometry, exponential and logarithms, equations and quadratic functions, and Sequences and Series. Data on the total of the material distribution and material indicators in the period of 2008 to 2017 is presented in Figure 1 (the data is sorted from the lowest to the most).

Generally, from 2008 to 2012, there were no difficulties for students in the NE on all the mathematics materials. The indicators that showed the students have no difficulties are seen from the overall absorption rate in 2008 which was 72.62%. The absorption continues to increase until 2012, which is 80.58%. However, there was a significantly decreased to 41.40% (see Figure 2) in 2013 and 2017. Although there was an increase in 2015, the increase was not significant and there a decrease in the next year. The same fact is also seen from the trendline that looks to the left (slope <0) which indicates the decreasing the tendency of absorption.

Based on the absorption rate in Figure 2, further analysis is needed to find out the condition of NE in the period of 2013 to 2017. Then, the absorption of the NE is low. For this purpose, annual absorption data needs to be mapped (absorption <50% and absorption > 50%), then it obtained the details of materials with low absorption. Material with absorption less than 50% is categorized as difficult material; meanwhile, the material with absorption more than 50% is categorized as not difficult material. The results of material mapping based on the absorption are presented in Figure 3.

Based on Figure 3, the students did not experience difficulties when viewed from the mean of absorption of the mathematics material from 2008 to

Figure 1
Indicators Distribution of Mathematics Materials Tested at The NE in The Period of 2008 to 2017

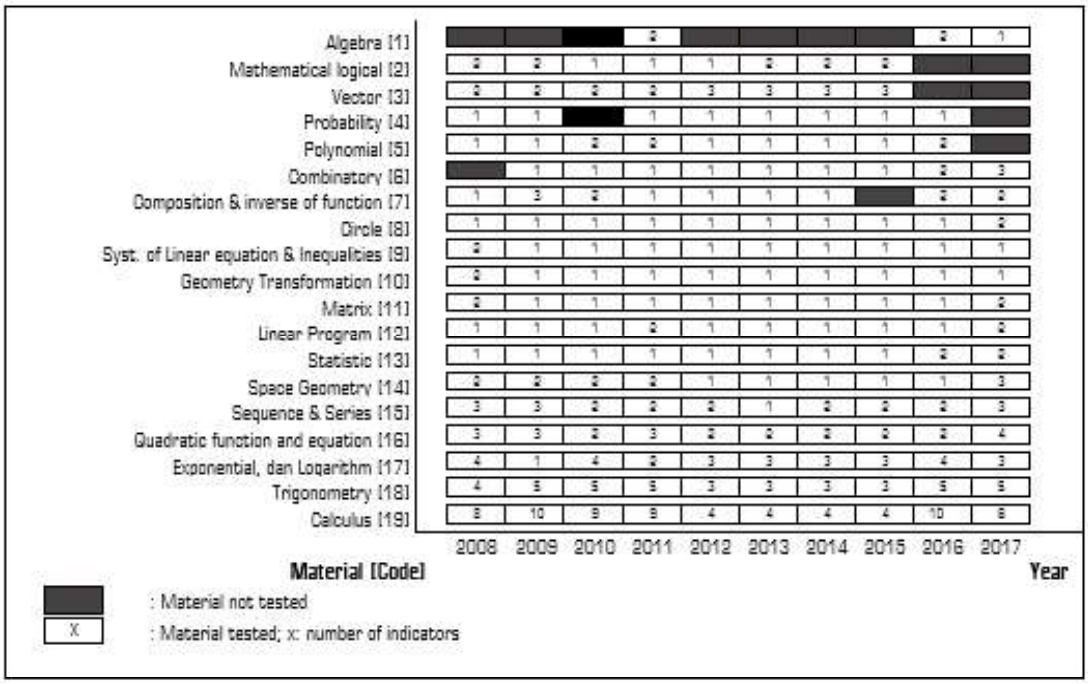
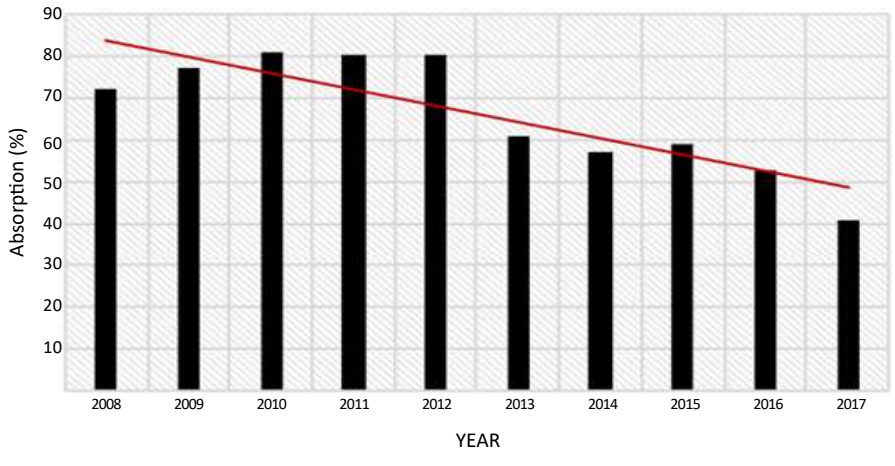
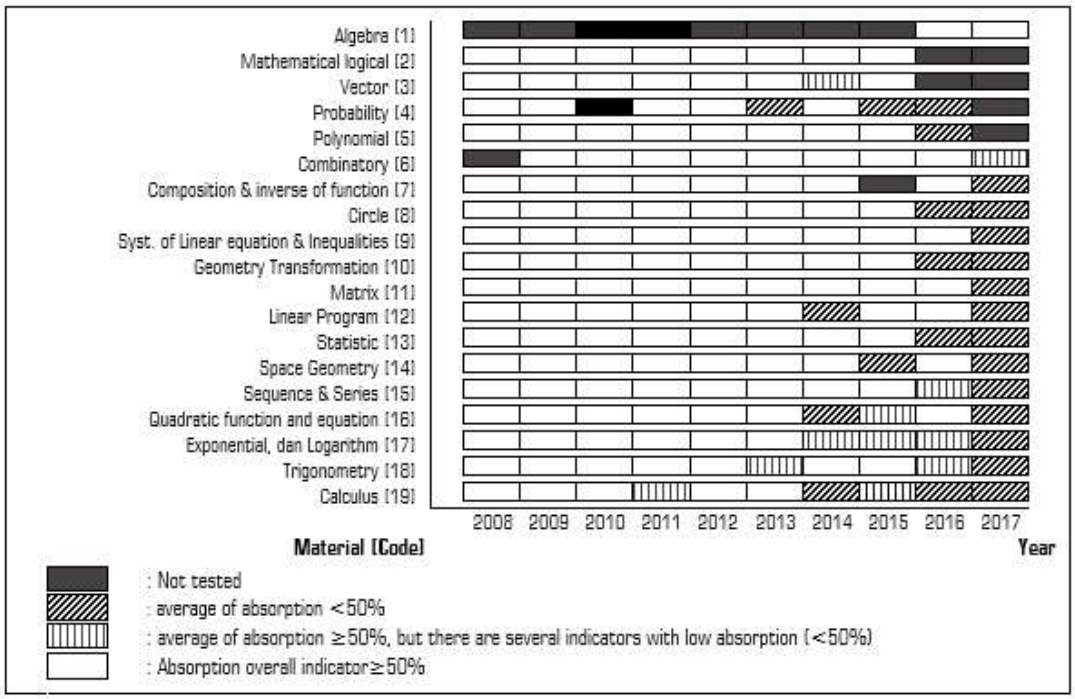


Figure 2
Graph of The Development The Mean Absorption in The Mathematics Subject at NE in The Last 10 Years



2012. From the indicator of material competency, the difficulties are seen on one material (calculus) in 2011. However, in the next 5 years (2013 to 2017), there were difficulties in several mathematical materials. Moreover, the difficulties are

Figure 3
Distribution of Mathematics Materials in NE Based on the Absorption Data



seen in most of the mathematical material in the question in the NE in 2016. Of all the mathematics material in 2016, only 8 materials were not difficult. In fact, there are more shocking conditions in 2017. Of all the material tested, there was only one material (algebra) which categorized as not difficult.

The policy changing in 2013 and 2015, indeed, has an impact on the results of the NE. In Figure 4, a significant difference in the mean absorption of mathematics material at the NE in the last 10 years. In the period of 2008 to 2012, almost all the material absorption was above 70% (there is only one material that is less than 70%, namely solid geometry). Meanwhile, in the period of 2013 to 2014, there were only 2 materials which the absorption is more than 70% and the rest is less than 70%. Absorption has decreased in the last three years (2015 to 2017), which is mostly less than 60%. Moreover, 7 materials have absorption which is less than 50%. The materials are probability, geometry transformations, solid geometry, calculus, circles, linear programs, and statistics.

The absorption of NE is certainly influenced by the distribution of the question's types tested each year. Therefore, the indicators of questions are mapped into two types: the question of applying the common concepts (standard questions) and problem-solving. The results of mapping the question types tested in the period of 2008 to 2017 at the NE is presented in Table 1.

Based on Table 1, the total indicators of problem-solving often appear from 2012 to 2017 (about 25% to 51.7%). The data is different from previous years which only ranged from 10% to 15% of the total

Figure 4
Comparison of the Mean of Material Absorption at The NE in The Last 10 Years

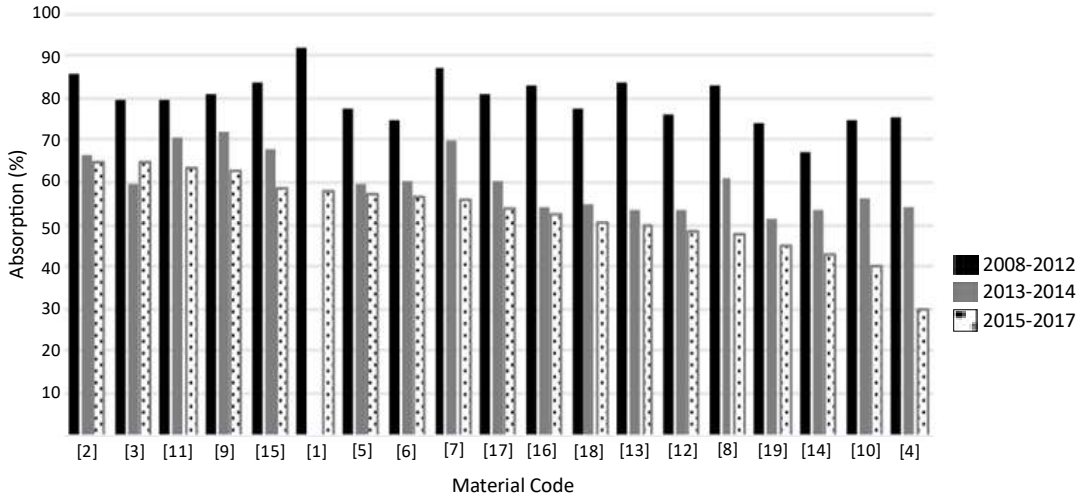


Table 1
Summary of the Number of Materials and Indicators with Absorption <50%

Materials / indicators	Year								
	2008	2009	2011	2012	2013	2014	2015	2016	2017
Material	- (n=17)	- (n=18)	1 (n=19)	- (n=18)	2 (n=18)	5 (n=18)	5 (n=17)	9 (n=17)	14 (n=15)
Indicators of routine problems	- (n=34)	- (n=36)	- (n=34)	- (n=14)	1 (n=15)	1 (n=15)	3 (n=15)	12 (n=29)	27 (n=30)
Indicators of problem-solving	- (n=6)	- (n=4)	1 (n=6)	- (n=15)	2 (n=14)	5 (n=15)	3 (n=14)	6 (n=11)	8 (n=10)
Total of all material indicators	40	40	40	29	29	30	29	40	40

indicators tested. This data seems to show a correlation between the numbers of problem-solving indicators with several difficult materials in the NE. In other words, the low absorption is caused by problem-solving questions in the NE. However, the number of problem-solving indicators was 51.72% in 2012 and there were no difficulties in the material of NE. Meanwhile, by 25% the number of indicators of problem-solving in 2016 and 2017 the difficulty appears from the indicators of the application of concepts in the standard questions. These conditions indicated that the difficulties are not only caused by the characteristics and distribution of the question types. In other words, there are other factors that also influence the low absorption score. Therefore, the analysis continued by looking at the difficulties in each year.

In 2011, there were 19 materials tested at the mathematics subject in the NE. Table 2 shows that students' difficulties are in the problem-solving question type. Figure 5 shows one of the calculus questions in the NE on 2011, which is a problem-solving question and the question cannot be solved directly by using the characteristic or rules of differential. Based on the data and documentation of the question in 2011 NE, found out that the students' difficulties in the NE on 2011 are only in one material,

Table 2
The Details of Absorption of The Difficult Question in The 2011 NE

Code	Material & Indicators of Competence	Absorption (%)	Description
[19]	**Calculus**	**(76.90)**	
	Solve the question of application the differential	47.70	Difficult

Figure 5
The Question of Application The Differential in 2011 NE

31. A company produces x products at a cost of IDR $(9000+1000x+10x^2)$. If all of the company's products are sold at a price of IDR 5,000 for one product, then the maximum profit that the company can get is ...
A. IDR 149,000.00
B. IDR 249,000.00
C. IDR 391,000.00
D. IDR 609,000.00
E. IDR 757.000.00

namely calculus, which is a problem-solving question.

In 2013, there were 2 difficult materials, namely probability, and trigonometry. Based on the mean of absorption; the absorption of less than 50% is only seen in the probability material. Meanwhile, the mean of absorption on trigonometry material was more than 50%. Although the mean of absorption has above 50% but there found some indicators with a mean of less than 50%. The details of students' difficulties in the material are presented in Table 3.

Based on the distribution of material indicators (see Figure 1), there is only one indicator in the probability material tested at the NE in 2013. The material indicators of the probability are related to problem-solving involving the concept of probability. For example, in the calculus material, the low absorption of probability material is also shown in the indicators relating problem-solving. The probability questions in the NE in 2013 are presented in Figure 6.

Although the mean of absorption on trigonometry material in 2014 was more than 50% (51.08%) but the absorption in the indicators of trigonometry problem-solving questions was also low. There is one indicator in trigonometry material which

Table 3
The Details of Absorption of The Difficult Question in The NE on 2013

Code	Material & Indicators of Competence	Absorption (%)	Description
[4]	**Probability**	**[45.87]**	
	Solve the question of probability	45.87	Difficult
[18]	**Trigonometry**	**[51.08]**	
	Solve the question of geometry using sine and cosine	49.97	Difficult

Figure 6
The Question on Probability Material in The NE on 2013

40. A documentary shows about earthquakes and how often earthquakes occur. The film includes a discussion of the estimated earthquake. A geologist stated "In the next twenty years, the chance that an earthquake will occur in the city of Zadia is 2/3".
Which of the following best reflects the intent of the geologist?
A. $\frac{2}{3} \times 20 = 13,3$, so that between 13 and 14 years from now there will be an earthquake in the city of Zadia
B. $\frac{2}{3}$ greater than $\frac{1}{2}$, so we can be sure that there will be an earthquake in the city of Zadia sometime in the next 20 years
C. The chance of an earthquake in the city of Zadia at some time in the next 20 years is higher than the probability of an earthquake not occurring.
D. We cannot say what will happen, because no one can be sure when an earthquake will occur.
E. Surely there will be an earthquake 20 years to come, because it has been estimated by geologists.

is categorized as difficult from the three indicators. The trigonometry questions in the NE in 2014 are presented in Figure 7. The questions in Figure 6 and 7 cannot be solved directly by applying the concept. It requires an understanding of the relationship between concepts and the context (see Figure 6), and how to determine the right rules according to the situation in Figure 7.

In 2014, there found difficulties on five materials, namely vectors, linear programs, quadratic equations, and functions, exponential and logarithms, and calculus. The details of students' difficulties in the material are presented in Table 4.

Students' difficulties in the NE in 2014 are in problem-solving questions or applied concepts. Problem-solving and applied concepts consist of two types, namely involving other concepts or using real-world contexts. The examples of difficult questions in 2014 are presented in Figure 8 and 9.

There found similar data on 2015 with data on 2013 and 2014, which there found difficulties on four materials, namely probability, geometry, quadratic equations and functions, and exponential and logarithms. The details of students' difficulties in the material are presented in Table 5.

In the probability material, quadratic equation, and function, exponential and logarithmic, and calculus still have the

Figure 7
Problem-solving Question of Trigonometry in 2013

27. The ABCD cube has a 6 cm rib length. α is the angle between the CG line and the BDG plane. The value of cos α is ... .
A. $\frac{1}{4}\sqrt{3}$
B. $\frac{1}{3}\sqrt{3}$
C. $\frac{1}{2}\sqrt{3}$
D. $\frac{1}{3}\sqrt{6}$
E. $\frac{1}{2}\sqrt{6}$

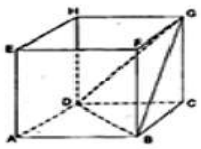


Table 4
The Details of Absorption of The Difficult Question in The NE on 2014

Code	Material & Indicators of Competence	Absorption (%)
[3]	**Vector**	**[53.65]**
	Solve the question on vector material	46.45
[12]	**Linear Programs**	**[38.99]**
	Solve the question on linear programs	38.99
[16]	**Quadratic Equations and Functions**	**[47.35]**
	Solve the question on Quadratic Equations and Functions	28.09
[17]	**Exponential and Logarithms**	**[53.37]**
	Solve the question on exponential and logarithms	29.91
[19]	**Calculus**	**(4836)**
	Solve the question on differential	33.69
	Calculate the area and volume of rotary object using integral	42.14

Figure 8
Questions of Linear Program Using Real-world Context in The NE on 2014

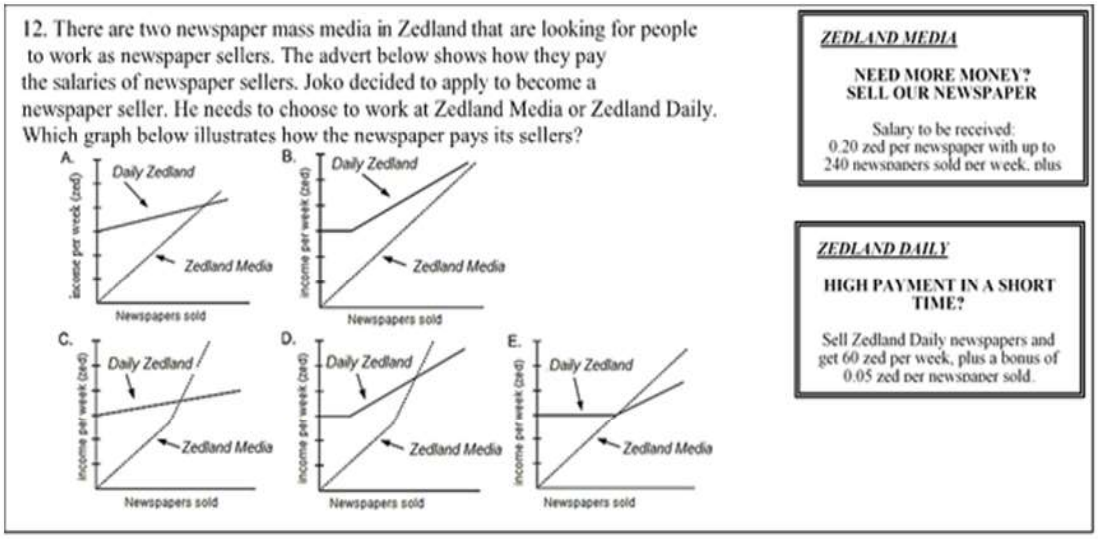


Figure 9
Questions of Vector Using Trigonometry Concept in The NE on 2014

12. Given vectors $\vec{u} = b\vec{i} - 12\vec{j} + a\vec{k}$ and $\vec{v} = a\vec{i} + a\vec{j} + b\vec{k}$. The angle between vectors $\vec{u}$ and $\vec{v}$ is θ with $\cos\theta = \frac{\sqrt{3}}{4}$. Vector $\vec{u}$ projection on $\vec{v}$ is $\vec{p} = -4\vec{i} - 4\vec{j} + 4\vec{k}$. The value of b is ... .

A. $4\sqrt{7}$ B. $2\sqrt{14}$ C. $2\sqrt{7}$ D. $\sqrt{14}$ E. $\sqrt{7}$

Table 5
The Details of Absorption of The Difficult Question in The NE on 2015

Code	Material & Indicators of Competence	Absorption (%)
[4]	**Probability**	**[12.39]**
	Solve the question on Probability	12.39
[14]	**Geometry**	**[37.58]**
	Calculate the distance and angle between two objects in the three-dimensional space	37.58
[16]	**Quadratic Equations and Functions**	**[58.82]**
	Solve the question on Quadratic Equations and Functions	45.88
[17]	**Eksponensial, dan Logarithm**	**[62.11]**
	Solve the question on Quadratic Equations and Functions	48.97
[19]	**Calculus**	**[51.06]**
	Solve the question on differential	40.77
	Calculate the area and volume of rotary object using integral	44.42

same difficulties, namely the indicator of competence related to problem-solving or applied concepts. Meanwhile, the difficulties in the geometry material are in visualizing the geometric shape or the display in narrative questions. The example of geometry question in 2015 is presented in Figure 10.

As previously mentioned, there were difficulties in 2016. The details of difficult mathematical material in the NE in 2016 are presented in Table 6. Table 6 shows that difficulties in the NE in 2016 are in the problem-solving questions such as applying a concept to another concept or application of concepts into real world contexts.

However, unlike to previous years, in 2016, there also find difficulties in several indicators that are not related to problem-solving or the application of concepts of real-world contexts. In Table 6, there are difficulties in indicators toward the application of rules or using the characteristic or theorems in a concept. In this case, students also have difficulty in problem-solving of applying the common concepts (standard questions).

There are four difficult indicators of the application of rules or using the characteristic or theorems in a concept, such as: determining the results for polynomial calculation, determining the limit score, determining

Figure 10
Difficult Questions on Geometry Material on 2015

25. ABCD.EFGH cube is known with a 12 cm rib length. Point P is in the middle of BC. The distance from point G to the US is … .
A. $6\sqrt{2}$ cm
B. $6\sqrt{3}$ cm
C. $\frac{3}{5}\sqrt{30}$ cm
D. $6\sqrt{5}$ cm
E. $\frac{12}{5}\sqrt{30}$ cm

Table 6
The Details of Absorption of The Difficult Questions in The NE on 2016

Code	Material & Indicator of Competence	Absorption (%)
[4]	**Probability**	**[47.36]**
	Solve the problem of probability	47.36
[5]	**Polynomial**	**[48.93]**
	Determined the divided result of polynomial in degree of three	47.24
[8]	**Circle**	**[45.21]**
	Determine the circle tangent equation associated the concept of parallel lines	45.21
[10]	**Geometry Transformation**	**[36.80]**
	Determine the map / shadow of a curve of the composition of the two transformations	36.80
[13]	**Statistics**	**[42.77]**
	Specifies the mode from the histogram data	41.64
	Solve the reasoning questions related to statistics	43.89
[15]	**Sequences and Series**	**[60.15]**
	Solve the question related to arithmetic sequences and series	47.21
[17]	**Exponential**	**[57.45]**
	Determine the completion of logarithmic inequalities	37.82
[18]	**Trigonometry**	**[51.11]**
	Determine the surface area of the prism using the rules of sine and cosine	46.10
	Determine the score of angular trigonometric comparison between lines & space of geometry	49.93
	Solve the reasoning question associated with trigonometry	47.51
[19]	**Calculus**	**[46.68]**
	Determine the limit score of the trigonometry function	46.84
	Determine the first differential function using chain rules	40.85
	Solve the problem relating to differential	25.68
	Determine the integral of simple algebra function through partial or substitution	44.13
	Calculate the area using integrals	48.10
	Solve the reasoning question relating the calculus	45.08

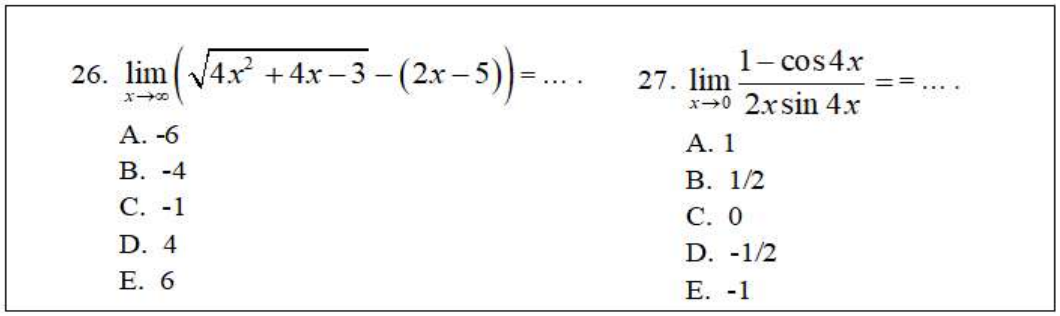
the first differential, and determining indeterminate integrals. The examples of these questions are presented in Figure 11 and 12.

In 2017, students' difficulties were in all material except in algebra material (see Table 7). From the competency indicators,

Figure 11
Difficult Questions on Polynomial Material in The NE on 2016

11. Known $f(x) = 3x^3 + ax^2 - 7x + 4$. If $f(x)$ is divided by $(3x-1)$ then the remainder is 2. If $f(x)$ is divided by $(x+2)$, then the result is ....
A. $3x^2 + 10x - 13$
B. $3x^2 - 10x - 13$
C. $3x^2 + 10x + 13$
D. $3x^2 - 4x - 1$
E. $3x^2 - 4x + 1$

Figure 12
Difficult Questions on Limit Polynomial Material in The NE on 2016



there are 29 indicators with absorption of less than 50%. As occurring in previous years, there are 10 difficult indicators on the problem solving or applying in a concept in a real-world context.

In addition, there are 19 indicators on the application of rules or using the characteristic or theorems in a concept with the absorption of less than 50%. This number is higher than in the previous year (there were only 4 indicators in 2016) which means the difficulties experienced by students also increasing. The examples of these difficult questions are presented in Figure 13 and 14.

If we carefully examine the characteristics of the questions in Figure 13 and Figure 14, then the questions should be solved directly by applying simple algorithms, as it has learned in the class. For example, a definite integral question (see figure 14) can be immediately solved by applying the quadratic rule to the integral function. And then, it substitutes the upper and lower limits of the integration results.

If considering the absorption of calculus material from 2008 to 2015, the students should not have difficulty to the questions in Figure 14 because the questions are common problems faced by students when they study the material of calculus. However, absorption in the sample questions is low (47.51%). This shows a new problem which is the factor of difficulties in solving the question in the NE on 2017.

Data analysis results showed a trend of decreasing the absorption of the NE from 2013 to 2017. The decreasing was indicated by the low absorption of several the materials tested. Several mathematics materials, such as probability, geometry transformations, solid geometry, calculus, circles, linear programs, and statistics, have low absorption on NE from 2013 to 2017. The score of low absorption in 2013 to 2015 was dominated by material indicators in measuring the problem-solving ability. However, in 2016 and 2017, the low absorption was found in material indicators that only measured the ability in solving the common concepts or standard questions.

Some previous research results showed that the difficulties in solving mathematical problems are caused by cognitive factors and non-cognitive factors. The cognitive factors make the students' difficulties are explained as follow. The research conducted by Prayitno, *et al* (2017)found that, in solving the mathematical problems, students have difficulty in understanding the problems, connecting with previous concepts, and

Table 7
The Details of Absorption of The Difficult Questions in The NE on 2017

Code	Material & Indicators of Competence	Absorption (%)
[6]	**Combinatory**	**[50.91]**
	Solve the question of the counting rules material	41.55
	Solve the daily life problem using counting rules material	29.38
[7]	**Composition and Inverse ofFunction**	**[43.04]**
	Determine the value of function f when the function g and its composition are known	43.37
	Determine the inverse of a composition of two functions	42.71
[8]	**Circle**	**[34.40]**
	Determine the circle equation	29.43
	Determine the tangent equation of the circle	39.36
[9]	**System of Linear equation & Liniear Inequalities**	**[47.33]**
	Solving the narrative question of SPLTV	47.33
[10]	**Geometry Transformation**	**[29.84]**
	Determine the map of a curve by the composition of the two transformations	29.84
[11]	**Matrix**	**[49.71]**
	Determine the inverse of addition and multiplication of matrix	49.35
[12]	**Linear Program**	**[41.23]**
	Solve the question on linear program	41.23
[13]	**Statistics**	**[40.08]**
	Specifies the mode from the histogram data	35.64
	Determine the data of the group presented in the table	44.51
[14]	**Geometry**	**[38.31]**
	Calculate the distance and angle between two objects in a space	38.31
[15]	**Sequences and Series**	**[46.37]**
	Determine the formula of total n of the first polynomial in the geometri sequences	38.65
	Solve the question of sequences and series of geometry	49.40
[16]	**Quadratic Equations and Functions**	**[39.48]**
	Using the sum proeperties and total of multiplication of the roots of the quadratic equation	40.48
	Arrange the new quadratic equation from the roots of other squares	41.12
	Determine the borders of coefficient score in the form of variable using discriminant	35.14
	Determine the variable score when the graph of quadratic equations touches on the x-axis	41.17
[17]	**Exponential and Logarithms**	**[41.25]**
	Determine the result of algebra calculation in the form of logarithms	37.16
	Determine the completion of exponential function inequality	35.75
[18]	**Trigonometry**	**[39.68]**
	Calculate the comparison score of trigonometry	39.443
	Solve the narrative question relating the sine or cosine rules	45.01
	Using the sum properties and differences of sine and cosine rules	35.07
[19]	**Calculus**	**[37.26]**
	Calculates the limit score of algebra function	34.11
	Determine the tangent equation of the curve	30.69
	Determine the inequality integral of function through substitution	39.59
	Calculate the function of integral	47.51
	Solve the question of differential	37.52

using strategy. In addition, other research showed that in solving the questions in the NE, students found difficulty in choosing and identifying information, calculating, or misunderstanding by choosing the wrong choice of answers (Retnawati,

Figure 13
The Example of Questions on Composition Function in The NE on 2017

5. The function $f : R \to R$, $g : R \to R$ known, with $g(x) = -x + 3$ and $(f \circ g)(x) = 4x^2 - 26x + 32$. The value of $f(1)$ is … .

A. -5 B. -4 C. -3 D. 3 E. 4

Figure 14
The Example of Questions on Calculus in The NE on 2017

23. The value of $\int_2^4 (6x^2 - 6x - 1)\, dx$ … .

A. 64 B. 68 C. 72 D. 74 E. 76

Kartowagiran *et al*., 2017). The problems are caused, because, the students are not usual in facing problem-solving questions and narrative question or using real-world contexts (Retnawati, Kartowagiran, *et al*., 2017). Another research discussing the questions of task equivalent to the NE indicated that students have difficulty in understanding images (Rumasoreng & Sugiman, 2014). Meanwhile, non-cognitive factors that affect student difficulties include students' anxiety, running out of time, and giving up easily (Novferma, 2016; Tias & Wutsqa, 2015).

The low absorption of NE from 2013 to 2017, such previous explained in the analysis results, it always related to the policy changing. Such previously explained, there had been a policy change in 2013 related to the implementation of the Curriculum 2013. The changing was followed by the number of indicators of problem-solving in the questions which increases (25-51%). The conclusion obtained if compared to the result in 2008 to 2011 which was less than 20% of all material indicators. The difficulties in 2013 to 2015 are in indicators that measure the problem-solving abilities. The result showed that the factor of the students' difficulties in 2013 to 2015 was that they were less familiar with problem-solving questions. However, the results of the NE in 2012 (before the implementation of Curriculum 2013) showed the opposite result. With the number of 51% indicators of problem-solving questions, it did not find a low absorption. Means, the factors of low absorption in 2013 to 2015 might not only be associated with the number of problem-solving indicators in the NE. Other factors, such as the quality of the question, are also the factors that distinguish the results (Sulistiawan, 2016) before and after the implementation of the new curriculum.

Problems on students' difficulties in solving the questions of problem-solving

ability can solve by training the students through the learning process. Various learning activities might be planned by teachers who train students' abilities in solving mathematical problems (Djidu & Jailani, 2017). The changing of Curriculum 2013 has also recommended the implementation of learning with various learning models such as problem-based learning (Apino & Retnawati, 2017; Djidu & Jailani, 2018; Djidu & Retnawati, 2018; Listiani, 2016) or project based learning (Anazifa & Djukri, 2017), or the other activities to train the students with mathematical problems (Djidu & Jailani, 2017). This means that the teachers' understanding of planning mathematics learning (Retnawati, Djidu *et al*., 2018) is a key to solve the problem of students' difficulties.

Meanwhile, the new policies on the changing in status and technical implementation of the NE in 2015 also influenced the absorption of NE on mathematics subjects. In this case, the status changing, and technical implementation of the NE were followed by decreasing the absorption of the NE. In this change, low absorption is not only on indicators of problem-solving abilities but also occurs in the indicators of questions in common concepts or standard questions. This showed that the policies issued in 2015 had a significant impact on decreasing the absorption of the NE, especially on mathematics subjects.

If viewed from the technical implementation, the implementation of computer-based exam is actually considered as better for national-scale assessments (Debuse & Lawley, 2016; Logan, 2015; O'Leary, Scully, Karakolidis, & Pitsia, 2018), due to it produces more valid results (Diaz Maggioli, 2018; Shute & Rahimi, 2017; Suwarto, 2017). However, the implementation of the computer-based exam also makes the extraneous cognitive load on students in answering questions, such as, when they are not familiar with using a computer (Logan, 2015). In addition, various technical problems in implementing the NE (Retnawati, Hadi, *et al*., 2017) also become one of the factors contributing to influencing the results obtained by students. This fact showed that the policy changing on the technical implementation of the NE also influence the absorption within students. However, aiming to find out in more detail the difficulties through the implementation of computer-based exams, it needs further research.

The policy in the changing of NE status also had a negative impact on the absorption of the NE. Research in 2015 showed that the policy changing on the NE status in 2015 greatly affected the readiness of students (Saukah & Cahyono, 2015). The results indicated that schools with low grade are greatly affected by the changes in NE status. For example, there decrease the motivation of students in following the exams (Saukah & Cahyono, 2015). The results provide empirical evidence that the low absorption of the NE in 2016 and 2017 does not merely describe the students' difficulties in completing the questions in the task of the NE. And, also, it supported by the low trend of absorption in the questions which apply simple concepts or common questions. Means, the low absorption is caused by the low motivation or seriousness of students in following the NE.

CONCLUSIONS

The phenomenon in 2013 to 2017 showed that the changes in education policy in Indonesia, especially the implementation of the NE, have an impact on reducing the absorption of NE, especially on mathematics subjects. The decrease in absorption is not only caused by cognitive

aspects but also non-cognitive aspects of students following the NE. Generally, some materials such as probability, geometry transformations, solid geometry, calculus, circles, linear programs, and statistics, have low absorption or might categorize as difficult material in the NE on 2013 to 2017. The difficulties, generally, are in the narrative questions of problem-solving or uses real-world context. The analysis results also indicate non-cognitive impacts causing by policy changes, especially the status and technical implementation of the NE, which has implications for the low absorption of the mathematics in the NE.

Even though the technical implementation of the NE also affects absorption, but these problems may solve by using computer-based assessments in schools. However, the changes in NE status that are no longer a determinant of student graduation still need to review because they affect non-cognitive aspects such as motivation or seriousness of students in following the NE. Therefore, it needs further research aiming to find out more details about non-cognitive effects because of the changing of NE policies in Indonesia.

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