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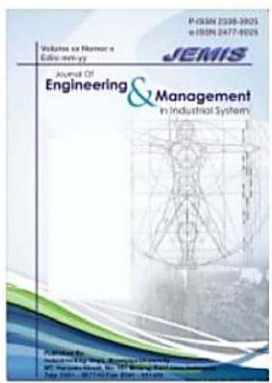


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THE EFFECT OF WRITING FORMAT ON STUDENT READING COMPREHENSION ON PAPER MEDIA USING COMPLETELY RANDOMIZED FACTORIAL DESIGN

¹⁾Rexy Satrya Yuwana Adam, ²⁾Yuswono Hadi

^{1),2)} Industrial Engineering, Faculty of Science and Technology, Universitas Ma Chung

Abstract Paper writing with the existing writing format causing excessive paper usage. Excessive paper usage could lead to environmental destruction. Therefore, it is necessary to find an alternative in the writing procedure by doing an experimental design based on student reading comprehensive. This study uses Completely Randomized Factorial Experimental Design. After analysis of variance and the multiple comparisons test done, it results a new writing format alternative that use less paper than the existing writing procedure. In other hand, it results greater student reading comprehensive than the existing writing procedure. With the results, the application of the alternative procedure can save the paper usage and make student easier to understand the paper.

Keywords: excessive paper usage, writing format, completely randomized factorial experimental design

1. Introduction

In this digital era, study activities in University still can't avoid paper usage. For study activities, a student will face hundreds of assessments that need a lot of paper, especially when a student facing internship report and essay. A student needs approximately one rim or more of paper in the process of internship report or essay writing. This shows that paper writing with the existing writing format leads to excessive paper usage. Excessive paper usage causes so many effects to the environment, start from the paper production waste to the paper after use waste. Not only the waste, but also its needs of tree as its base material. A five years old tree only for one rim paper production. Therefore, it's clearly needed an alternative for paper writing format that use less paper.

From figure 1, it is shown that writing format in text book use less paper than writing format in essay. In essay format, the text height is 2,72 cm, in text book format, the text height is 1,18 cm. Using text book format leads paper usage saving up to 56,61%. Only by changing the format it could decrease the paper usage.

The objective of this research is to provide a new writing format that not only use less paper but also could results greater reading

comprehension for student. This research will use Completely Randomized Factorial Experimental Design. Experimental design is conducted to get responses from the objects in a certain condition that designed by the experiment conductor. In experimental design, there are three important things, objects response, given treatment, and environmental condition that could affect the experimental results [1].

2. Research Methodology

There are some steps in this research. Those steps arranged systematically in a flowchart. Figure 2 is the flowchart of this research.

2.1 Experimental Design

Experimental design started with determining desired responses and will be followed with determining factors and levels and what kind of experimental design that will be used in this research.

2.1.1 Determining Desired Responses

This research desired responses are the level of reading comprehension. Reading comprehension only occurred if there is interaction between a reader and a text. In order to understand a text, the reader have to read the text first [2]. Therefore, appropriate text choosing is needed. This research objects are

* Corresponding author. Email :

411410013@student.machung.ac.id

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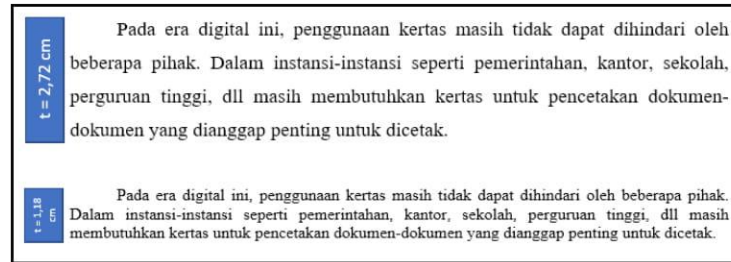


Fig 1. Comparison Between Essay Format in Universitas Ma Chung and Text Book Format

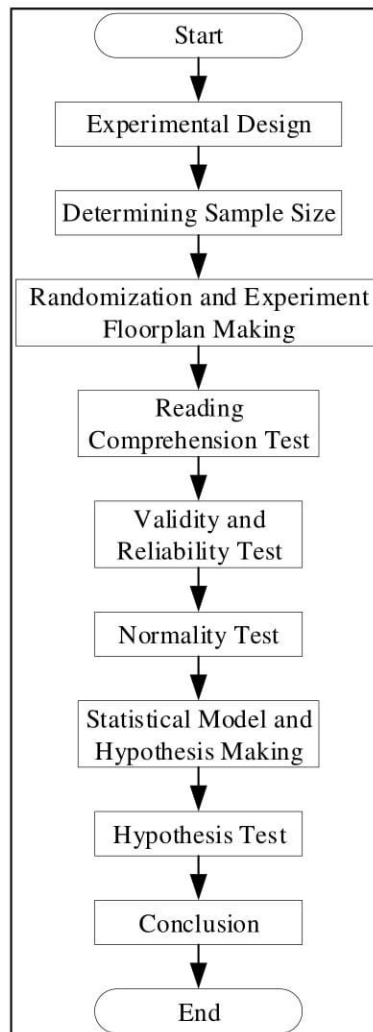


Fig 2. Text Conformity Test by Fry Graphic

active students of Universitas Ma Chung, which is start from the first year students up to nearly graduated students. In order to make sure all students capable understanding the text, this research use Fry Graphics to check if the text suitable or not.

Fry Graphics could determine text readability from the sum of syllables and sentences in the text [3]. There are some procedures to use Fry Graphics [3] :

1. Choose 100 words from a text

2. Count the sum of sentences in the chosen 100 words, if the last word ends in the middle of a sentence, it will be counted in decimal forms
3. Count the sum of syllables in the chosen 100 words, if the text in Bahasa Indonesia, times it by 0,6. The number 0,6 shows the comparison between syllable in Indonesian words and syllable in English words [4].
4. Look the Fry Graphic, in the graphic, line y shows the average number of sentences every

100 words, line x shows the average number of syllables every 100 words.

In this research, a text titled “Museum Nasional Indonesia” is taken from a website [5]. This is the calculation of sentences and syllables sum in “Museum Nasional Indonesia” text.

Table 1. Calculation of Sentences and Syllables in “Museum Nasional Indonesia” Text

100 words	Sentences	Syllables
1	3,36	158
2	4,92	155
3	3,73	156
Average	4,0	156,33

After got the results above, it will be continued by testing the text conformity using Fry Graphic as fig 3.

Based on the results above, it is shown that text “Museum Nasional Indonesia” is appropriate for at least High School Student on Grade 12. It means the desired experiment objects will be able to understand the text.

2.1.2 Determining Factors, Levels, and Experimental Design Method

Reading comprehension is affected by the text legibility [2]. Text legibility is affected by font type, font size, line spacing, and line length [3]. In the font type, the most readable font type is Serif type, this font has little leg in the lower part that looks like connecting each character. This can improve the reading speed and reduce eye strain [6]. In the font size, many publishers said that size 10 or 11 is the smallest size that can be used for printing a book [3]. Line spacing is the vertical distance between lines in a text. spacing, there are single, 1.5, double and multiple [7].

In this research, three factors are chosen, there are font size, line spacing, and line length.

Font type isn’t included because the existing writing format already use serif font type. For the line length, paper size used to control the line length. After determining the factors, it will be continued with determining the levels of each factors. For font size, three levels are chosen, 10, 11, and 12. For line spacing, two levels are chosen, single and 1.5 spacing. For the paper size, two levels are chosen, A4 and A5. Based on the factors and levels chosen, this research will use 2x3x2 Completely Randomized Factorial Experimental Design. Therefore, there are 12 combination that will be used as the treatment of this experiment:

1. A = Combination of paper size A4, font size 12, and line spacing 1.5.
2. B = Combination of paper size A4, font size 10, and line spacing 1,5.
3. C = Combination of paper size A4, font size 12, and line spacing 1.
4. D = Combination of paper size A4, font size 11, and line spacing 1,5.
5. E = Combination of paper size A4, font size 11, and line spacing 1.
6. F = Combination of paper size A4, font size 10, and line spacing 1.
7. G = Combination of paper size A5, font size 10, and line spacing 1,5.
8. H = Combination of paper size A5, font size 11, and line spacing 1.
9. I = Combination of paper size A5, font size 12, and line spacing 1,5.
10. J = Combination of paper size A5, font size 10, and line spacing 1.
11. K = Combination of paper size A5, font size 11, and line spacing 1,5.
12. L = Combination of paper size A5, font size 12, and line spacing 1.

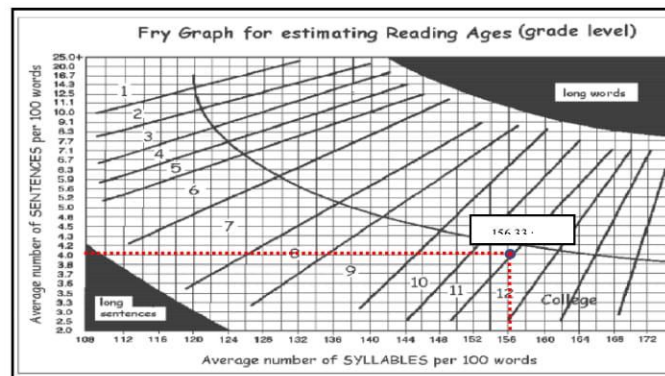


Fig 3. Text Conformity Test by Fry Graphic

2.2 Determining Sample Size

Sampling is conducted if it's impossible to do the experiment for the whole population. Slovin formula could help researcher to determine the sample size of a population with desired level of significance, here is the Slovin Formula[8].

$$n = \frac{N}{1+Ne^2} \quad (1)$$

Population that chosen in this research consists of 1142 active students. With the level of significance 0,1, this is the numbers of minimum sample for this research.

$$n = \frac{1142}{1+(1142*0,1^2)} = 91,95 \approx 92 \text{ people} \quad (2)$$

The numbers of minimum sample have been determined, after that, it will be divided into 12 difference treatments, the result becomes the numbers of replication of each treatment. The result is 8 students for each treatment, then it's rounded up into 10 students for each treatment. Therefore, total number of students that will be involved in this research will be 120 people.

2.3 Randomization and Experiment Floorplan

Based on the factors and the levels, it is known that there are 12 combinations between factors and levels. Every combination will be used as treatment in this experiment. Every treatment will be replicated 10 times, so there are 120 experiment units. Then it will be continued with randomization. In randomization, it will be started with generating 3 digits random numbers as many as the number of experiment units. Then, generated random numbers will be ranked start from smallest number up to the largest. After that, continue it with determine the treatment, here are the illustration of randomization [1].

Rank in the randomization will become the sequence number of the experiment, for example, based on the table, rank 1 got treatment C, then the first object should receive treatment C [1]. After do the randomization, the floorplan of this research become like Table 3.

Table 2. Illustration of Randomization

Random Numbers	Rank	Treatment
652	4	A
899	6	A
370	2	B
478	3	B
232	1	C
674	5	C

Table 3. Experiment Floorplan

1	2	3	4	5	61	62	63	64	65
D	D	E	K	I	B	H	L	I	D
6	7	8	9	10	66	67	68	69	70
B	G	E	G	E	D	A	J	K	C
11	12	13	14	15	71	73	73	74	75
H	G	H	A	A	F	I	K	E	A
16	17	18	19	20	76	77	78	79	80
F	E	D	J	G	H	K	J	I	B
21	22	23	24	25	81	82	83	84	85
J	C	H	L	A	C	L	A	B	C
26	27	28	29	30	86	87	88	89	90
L	E	F	K	I	C	E	L	C	G
31	32	33	34	35	91	92	93	94	95
F	B	B	A	G	D	A	K	J	D
36	37	38	39	40	96	97	98	99	100
K	G	B	J	C	C	I	D	C	H
41	42	43	44	45	101	102	103	104	105
L	E	K	C	F	L	J	G	I	J
46	47	48	49	50	106	107	109	109	110
I	D	L	J	E	F	L	I	K	F
51	52	53	54	55	111	112	113	114	115
F	G	A	I	F	A	G	D	B	H
56	57	58	59	60	116	117	118	119	120
L	H	F	B	J	E	H	K	B	H

2.3 Reading Comprehension Test on Student of Universitas Ma Chung

Reading comprehension test use text “Museum Nasional Indonesia”, each object will receive the same text but with different writing format. After finish reading the text, the object will get 10 questions to test their understanding of the text, the answer will be written in a sheet

of paper and will be given to the conductor after the test session. Reading comprehension test will be conducted based on the experiment floorplan in previous chapter. The test was conducted in April 2018, with the objects are active student of Universitas Ma Chung start from the first year student to the last year student. Table 4 is the result of reading comprehension test.

Table 4. Result of Reading Comprehension Test

No.	Treatment	Score	No.	Treatment	Score	No.	Treatment	Score
1	D	72,5	41	L	75	81	C	85
2	D	67,5	42	E	80	82	L	75
3	E	80	43	K	75	83	A	92,5
4	K	82,5	44	C	62,5	84	B	70
5	I	72,5	45	F	60	85	C	77,5
6	B	65	46	I	77,5	86	C	85
7	G	82,5	47	D	77,5	87	E	75
8	E	80	48	L	85	88	L	70
9	G	60	49	J	100	89	C	70
10	E	80	50	E	80	90	G	100
11	H	72,5	51	F	65	91	D	80
12	G	82,5	52	G	100	92	A	92,5
13	H	72,5	53	A	75	93	K	100
14	A	65	54	I	77,5	94	J	82,5
15	A	82,5	55	F	60	95	D	90
16	F	57,5	56	L	67,5	96	C	65
17	E	80	57	H	72,5	97	I	65
18	D	77,5	58	F	85	98	D	90
19	J	75	59	B	70	99	C	70
20	G	82,5	60	J	100	100	H	67,5
21	J	92,5	61	B	75	101	L	60
22	C	77,5	62	H	72,5	102	J	100
23	H	77,5	63	L	75	103	G	100
24	L	65	64	I	72,5	104	I	85
25	A	82,5	65	D	80	105	J	100
26	L	57,5	66	D	90	106	F	67,5
27	E	72,5	67	A	90	107	L	70
28	F	85	68	J	57,5	109	I	77,5
29	K	82,5	69	K	100	109	K	82,5
30	I	65	70	C	77,5	110	F	75
31	F	65	71	F	67,5	111	A	92,5
32	B	75	73	I	85	112	G	82,5
33	B	85	73	K	100	113	D	72,5
34	A	82,5	74	E	80	114	B	62,5
35	G	100	75	A	90	115	H	77,5
36	K	100	76	H	90	116	E	90
37	G	100	77	K	82,5	117	H	90
38	B	70	78	J	100	118	K	75
39	J	92,5	79	I	72,5	119	B	57,5
40	C	85	80	B	85	120	H	90

2.4 Validity and Reliability Test

After do the reading comprehension test, it is necessary to test the instrument, is it valid and reliable to obtain the desired responses or not.

2.4.1 Validity Test

Validity means the accuracy of an instrument to obtain desired responses [9]. In order to determine validity of instrument, it can be done by using Biserial Point Correlation. This is the formula for Biserial Point Correlation: [10]

$$r_{pbis} = \left(\frac{M_i - M_x}{S_x} \right) \sqrt{\frac{p}{1-p}} \quad (3)$$

After got the result of Biserial Point Correlation (table 5), the result will be compared to r table, if the biserial point correlation result smaller than the r table, so the instrument is not valid. This is the result of validity test based on Biserial Point Correlation.

From the result above, it can be concluded that all questions in this experiment instrument is valid, which means that the instrument is accurate to obtain desired responses.

2.4.2 Reliability Test

Reliability means the consistency of an instrument to obtain desired responses. Instrument is reliable if the results is consistent for repeated measurements [9]. This is formula K-R 21 to determine the reliability of an instrument [11]:

$$r_{11} = \left(\frac{k}{k-1} \right) \left(1 - \frac{\sum Si}{St} \right) \quad (4)$$

After the result obtained, then it will be

continued by comparing the result with the reliability level categories table 6 [11].

In this experiment, the reliability level of the instrument is :

$$r_{11} = \left(\frac{k}{k-1} \right) \left(1 - \frac{\text{Total Varians Item}}{\text{Varians Total}} \right) \\ = \left(\frac{10}{10-1} \right) \left(1 - \frac{72,142}{133,964} \right) = 0,513 \quad (5)$$

By the result, it shows that the instrument reliability is 0,513 which categorized moderate.

2.5 Normality Test

Normality test is needed to find the distribution of this experiment responses data. One of the method is Kolmogorov Smirnov test. In this method, data is compared with the standardized normal distribution data. If the experiment results data have the same distribution, it can be concluded that the experiment results data is distributed normally [12].

In this experiment, the normality test use Kolmogorov Smirnov by using Minitab 17. Fig 4 is the result of normality test.

Based on the result, it shows that KS value is 0,081, it is smaller than KS critical value 0,123. In the other hand, the *p* value is 0,053. The KS value is smaller than the KS critical value and the *p* value is larger than the level of significance, this shows that the data of student reading comprehension is normally distributed.

Table 5. The Results of Biserial Point Correlation

Problem no -	1	2	3	4	5	6	7	8	9	10
Correct	96	95	92	96	94	98	92	98	100	94
Wrong	24	25	28	24	26	22	28	22	20	26
<i>M_i</i>	80,23	80,45	81,44	80,86	80,77	81,40	80,57	80,99	80,43	80,58
<i>M_x</i>	79,17	79,17	79,17	79,17	79,17	79,17	79,17	79,17	79,17	79,17
<i>S_x</i>	11,57	11,57	11,57	11,57	11,57	11,57	11,57	11,57	11,57	11,57
<i>P</i>	0,80	0,79	0,77	0,80	0,78	0,82	0,77	0,82	0,83	0,78
<i>r_{pbis}</i>	0,184	0,22	0,36	0,29	0,26	0,41	0,22	0,33	0,24	0,23
<i>r</i> tabel (df=118)	0,15	0,15	0,15	0,15	0,15	0,15	0,15	0,15	0,15	0,15
Results	Valid	Valid	Valid	Valid	Valid	Valid	Valid	Valid	Valid	Valid

Table 6. The Level of Reliability Categories

<i>r₁₁</i>	Category
0,8 ≤ <i>r₁₁</i> ≤ 1,00	Very Reliable
0,6 ≤ <i>r₁₁</i> ≤ 0,79	Reliable
0,4 ≤ <i>r₁₁</i> ≤ 0,59	Moderate
0,2 ≤ <i>r₁₁</i> ≤ 0,39	Low
0,00 ≤ <i>r₁₁</i> ≤ 0,19	Very Low

2.5 Statistical Model

The basic statistical model for factorial

design which consist of three factors (A,B,C) and use completely randomized design as the experimental environment is as follow [13]:

$$Y_{ijkl} = \mu + \tau_i + \beta_j + \gamma_k + (\tau\beta)ij + (\tau\gamma)ik + (\beta\gamma)jk + (\tau\beta\gamma)ijk + \epsilon_{ijkl} \quad (6)$$

For this experiment, there are three factors, with two levels on the first and third factor and three levels on the second factor, here is the statistical model:

$$Y_{ijkl} = \mu + a_i + b_j + c_k + (ab)ij + (ac)ik + (bc)jk + (abc)ijk + \epsilon_{ijkl} \quad (7)$$

2.6 Hypothesis

Hypothesis that will be tested in this experiment are:

1. $H_0 : (abc)ijk = 0$, which means there is no effect of interaction between paper size, font size, and line spacing to the objects reading comprehension.

$H_1 : \text{at least one } (abc)ijk \neq 0$, which means there is an effect of interaction between paper size, font size, and line spacing to the objects reading comprehension.

2. $H_0 : (ab)ij = 0$, which means there is no effect of interaction between paper size dan font size to the objects reading comprehension.

$H_1 : \text{at least one } (ab)ij \neq 0$, which means there is an effect of interaction between paper size dan font size to the objects reading comprehension.

3. $H_0 : (ac)ik = 0$, which means there is no effect of interaction between paper size and line spacing to the objects reading comprehension.

$H_1 : \text{at least one } (ac)ik \neq 0$, which means there is an effect of interaction between paper size and line spacing to the objects reading comprehension.

4. $H_0 : (bc)jk = 0$, which means there is no effect of interaction between font size and line spacing to the objects reading comprehension.

$H_1 : (bc)jk \text{ at least one } \neq 0$, which means there is an effect of interaction between font size and line spacing to the objects reading comprehension.

5. $H_0 : ai = 0$, which means paper size is not affect objects reading comprehension.

$H_1 : \text{at least one } ai \neq 0$, which means paper size affect objects reading comprehension.

6. $H_0 : bj = 0$, which means font size is not affect objects reading comprehension.

$H_1 : \text{at least one } bj \neq 0$, which means font size affect objects reading comprehension.

7. $H_0 : ck = 0$, which means line spacing is not affect objects reading comprehension.

$H_1 : \text{at least one } ck \neq 0$, which means line spacing affect objects reading comprehension.

2.7 Analysis of Variance

In order to make an analysis of variance, it should be started first by calculating the sum of squares. This are the formula to calculate the sum of squares [13]:

$$SST = \sum_{i=1}^a \sum_{j=1}^b \sum_{k=1}^c \sum_{l=1}^n y^2_{ijkl} - \frac{y^2_{\dots}}{abcn} \quad (8)$$

$$SSA = \frac{1}{Bcn} \sum_{j=1}^b y^2_{j\dots} - \frac{y^2_{\dots}}{abcn} \quad (9)$$

$$SSB = \frac{1}{acn} \sum_{j=1}^b y^2_{.j\dots} - \frac{y^2_{\dots}}{abcn} \quad (10)$$

$$SSC = \frac{1}{abn} \sum_{j=1}^c y^2_{\dots j} - \frac{y^2_{\dots}}{abcn} \quad (11)$$

$$SAB = \frac{1}{cn} \sum_{i=1}^a \sum_{j=1}^b y^2_{ij\dots} - \frac{y^2_{\dots}}{abcn} - SSA - SSB \quad (12)$$

$$SSAC = \frac{1}{bn} \sum_{i=1}^a \sum_{k=1}^c y^2_{i\dots k} - \frac{y^2_{\dots}}{abcn} - SSA - SSC \quad (13)$$

$$SSBC = \frac{1}{an} \sum_{j=1}^b \sum_{k=1}^c y^2_{\dots jk} - \frac{y^2_{\dots}}{abcn} - SSB - SSC \quad (14)$$

$$SSABC = \frac{1}{n} \sum_{i=1}^a \sum_{j=1}^b \sum_{k=1}^c y^2_{ijk\dots} - \frac{y^2_{\dots}}{abcn} - SSA - SSB - SSC - SSAB - SSAC - SSBC \quad (15)$$

After do the calculation of sum of squares, then it will be continued with make the analysis of variance table, table 7 is the table of analysis of variance.

2.8 Hypothesis Test

1. $H_0 : (abc)ijk = 0$, which means there is no effect of interaction between paper size, font size, and line spacing to the objects reading comprehension.

$H_1 : \text{at least one } (abc)ijk \neq 0$, which means there is an effect of interaction between paper size, font size, and line spacing to the objects reading comprehension.

Based on the analysis of variance, the result of F for interaction between factor ABC is 1,69 and the F table is 3,07 for level of significance 0,05. Therefore F results $< F$ table, it shows that there is no effect from interaction between three factors.

2. $H_0 : (ab)ij = 0$, which means there is no effect of interaction between paper size dan font size to the objects reading comprehension.

$H_1 : \text{at least one } (ab)ij \neq 0$, which means there is an effect of interaction between paper size dan font size to the objects reading comprehension.

Based on the analysis of variance, the result

- of F for interaction between factor AB is 19,94 and the F table is 3,07 for level of significance 0,05. Therefore F results $> F$ table, it shows that there is effect from interaction between two factors.
3. $H_0 : (ac)ik = 0$, which means there is no effect of interaction between paper size and line spacing to the objects reading comprehension.
 H_1 : at least one $(ac)ik \neq 0$, which means there is an effect of interaction between paper size and line spacing to the objects reading comprehension.
Based on the analysis of variance, the result of F for interaction between factor AC is 0,04 and the F table is 3,92 for level of significance 0,05. Therefore F results $< F$ table, it shows that there is no effect from interaction between two factors.
 4. $H_0 : (bc)jk = 0$, which means there is no effect of interaction between font size and line spacing to the objects reading comprehension.
 $H_1 : (bc)jk$ at least one $\neq 0$, which means there is an effect of interaction between font size and line spacing to the objects reading comprehension.
Based on the analysis of variance, the result of F for interaction between factor BC is 1,06 and the F table is 3,07 for level of significance 0,05. Therefore F results $< F$ table, it shows that there is no effect from interaction between two factors.
 5. $H_0 : ai = 0$, which means paper size is not affect objects reading comprehension.
 H_1 : at least one $ai \neq 0$, which means paper size affect objects reading comprehension.
Based on the analysis of variance, the result of F for interaction between factor A is 8,457 and the F table is 3,92 for level of significance 0,05. Therefore F results $> F$ table, it shows that there is effect from factor paper size on objects reading comprehension.
 6. $H_0 : bj = 0$, which means font size is not affect objects reading comprehension.
 H_1 : at least one $bj \neq 0$, which means font size affect objects reading comprehension.
Based on the analysis of variance, the result of F for interaction between factor B is 3,072 and the F table is 3,07 for level of significance 0,05. Therefore F results $> F$

- table, it shows that there is effect from factor font size on objects reading comprehension.
7. $H_0 : ck = 0$, which means line spacing is not affect objects reading comprehension.
 H_1 : at least one $ck \neq 0$, which means line spacing affect objects reading comprehension.
Based on the analysis of variance, the result of F for interaction between factor C is 5,911 and the F table is 3,92 for level of significance 0,05. Therefore F results $> F$ table, it shows that there is effect from factor line spacing on objects reading comprehension.

Based on the Hypothesis Test Results, it can be concluded that both three factors affect the results of objects reading comprehension. However, there is interaction between factor font size and paper size that affect the results of objects reading comprehension, so that the main effects for both paper size and font size ignored. The main effect of paper size and font size ignored or become invalid because there is interaction effect between them that make their main effect not consistent. Therefore, to determine the best treatment for factor A and factor B, it should be based on the interaction effect. For factor C, the best treatment can be determined from the main effect result.

Based on the interaction plot of factor font size and paper size, it is clearly shown that there are different effect when 1 level of factor A combined with 1 level of factor B. In addition, the best reading comprehension results is obtained in treatment paper size A5 and font size 10, and both of them are use less paper. Therefore, alternative format for paper size is A5 and for the font size is 10.

Based on the main effects plot, it is shown that in line spacing 1.5, that treatment could obtain a high reading comprehension result. Therefore for alternative format in line spacing is 1.5 spacing.

According to the results above, we can decide the best alternative format that can results greater reading comprehension and use less paper than the existing format.

Table 7. Analysis of Variance Table

Variance Source	Sum of Squares	Degree of Freedom	Middle Squares	F Results	F Table $\alpha=5\%$
Treatment	6041,67	11			
A	775,21	1	775,21	8,457	3,92
B	563,23	2	281,61	3,072	3,07
C	541,88	1	541,88	5,911	3,92
AB	3655,10	2	1827,55	19,937	3,07
BC	193,44	2	96,72	1,055	3,07
AC	3,33	1	3,33	0,036	3,92
ABC	309,50	2	154,75	1,688	3,07
Error	9900,00	108	91,67		
Total	15941,67	119			

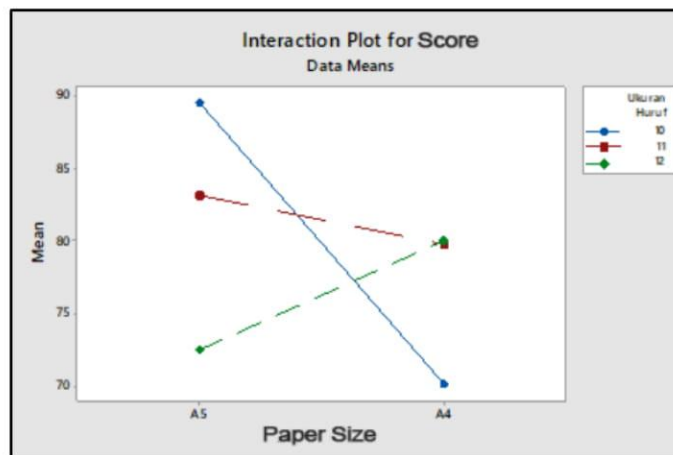


Fig 5. Interaction Between Factor Font Size and Paper Size Plot

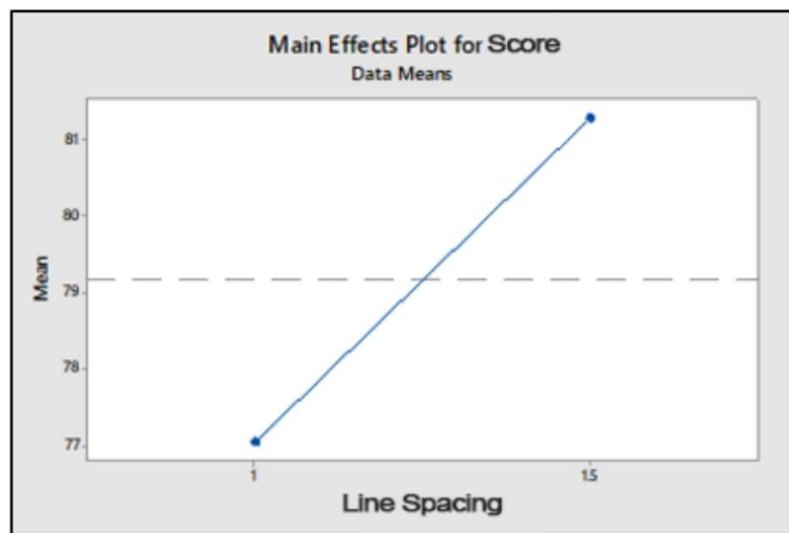


Fig 6. Main Effects of Line Spacing Plot

Based on the interaction effects plot, we can choose the paper size A5 and font size 10, because their interaction effects results the best comprehension score. In addition, paper size A5 and font size 10 use less paper than the other.

For the line spacing, we can decide the best line spacing based on the main effects plot, which shows that line spacing 1.5 results the best

comprehension score. Although line spacing 1.5 not results the least paper usage, it can be tolerated, because great reading comprehension is the first objective, and this alternative format still use less paper than the existing format. Therefore the alternative format is paper size A5, font size 10, and line spacing 1.5.

3. Conclusion

The conclusion that can be obtained from this research are as follows:

1. Based on Analysis of Variance results, three factors is confirmed have effect on student reading comprehension. In addition, there is interaction between factor font size and paper size. Therefore the main effect on factor font size and paper size is ignored.
2. Based on the interaction plot and main effect plot, we can conclude that the alternative writing format which have great reading comprehension level is paper size A5, font size 10, and line spacing 1,5. In addition, this writing format results less paper usage than the existing format (paper size A4, font size 12, line spacing 1,5).

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