The Effect of Fidgeting On Student Concentration Levels

K.A. Nugroho, M.C.D. Kurnianingtyas

ABSTRACT

Concentration is the ability needed to solve a problem. Students in learning also need concentration (DePorter et al., 2010). Unfortunately students have difficulty concentrating on doing a job. To help concentrate, students play pen, spin coins, play cellphones and other fun activities. To meet this goal, an agitated repellent device such as fidget spinner and fidget cube was made (Plafke, 2016). The benefits of spinner fidget for increasing concentration are still questionable (Schecter et al., 2017). Therefore, quantitative research is needed to prove the claim that fidget spinner can increase concentration. Unfortunately, there is currently no quantitative research that tests the effectiveness of these tools to increase short-term memory. The concentration level of a person can be measured using the Stroop test. Stroop tests utilize primitive cognitive operations, offering clues to the basic process of attention. The variable studied is Reaction Time for Correct Answer (RTCA), which is the amount of reaction time in answering correctly divided by the number of correct answers. The results of this study are the use of fidget spinner not having a significant effect on differences in the results of measurement of RTCA. The use of fidget spinner does not provide a significant difference in average error between not using fidget spinner and using fidget spinner.

1. INTRODUCTION

Concentration is the ability needed to solve a problem. Students in learning also need concentration (DePorter et al., 2010). Unfortunately, students have difficulty concentrating on doing a job. To help concentrate, students play pen, spin coins, play cellphones and other fun activities. Students drive out anxiety with paper clips, tap pens, squeeze stress balls, scribble paper, and generally play with any object in hand while pondering problems, drawing connections, and waiting for inspiration (Karlesky and Isbister, 2014). To meet this goal, an agitated repellent device such as fidget spinner and fidget cube was made (Plafke, 2016). Unfortunately, there is currently no research testing the effectiveness of these tools to increase short-term memory though the price of these tools is relatively expensive on the market.

A person's concentration level can be measured using the Stroop test. The Stroop test utilizes the primitive operation of cognition, offering clues to the basic process of concentration (MacLeod, 1991). Stroop test is very famous because it has a great influence and is always statistically reliable (MacLeod, 1992). Stroop test is done by giving the name of the ink color letters form the color word when the meaning of the word does not match the ink color (Ruff et al., 2003). The variable studied is Reaction Time for Correct Answer (RTCA), which is the amount of reaction time in answering correctly divided by the number of correct answers (Soetisna dan Tania, 2016).

This study aims to test the effectiveness of these aids in helping concentration in solving problems. The fidget spinner was chosen as research material because it is the most common agitated repellent device that sells well on

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the market today. This tool is at the top of the list of best-selling toys on the Amazon shopping site (Gregory, 2017).

2. LITERATURE REVIEW

Research on concentration measurements was conducted by Soetisna and Tania (2016) using a stroop test to measure concentration levels in military education institutions. Research conducted on a group of women in the UK who did fidgeting when sitting long in a chair. The result is a group with a high level of fidgeting, the risk of death is lower than the group of women who sit long in a chair but they do not move anything (Johnson et al., 2016). Schecter et al. (2017) in his research mentioning the benefits of fidget spinners to increase concentration is still questionable. He suggested making quantitative research to prove the claim that spinner fidget can increase concentration.

3. RESEARCH METHODOLOGY

At this stage the stages in the research "The Effect of Fidgeting on Student Concentration Levels" will be explained. Research methodology flowchart can be seen in Figure 1.

Conducting literature studies related to spinner fidget, concentration testing, and stroop testing. Literature study is done by reading journals and articles related to the topic. After conducting a literature study, it proceed with formulating the problem and research objectives. The problem is that there are no studies that test the effectiveness of spinners in improving short-term memory. Therefore, the purpose of this research is to test the effectiveness of fidget spinner in helping to concentrate quantitatively.

The first test carried out was stroop test without using fidget spinner. Testing is done by color and word interference. Color and word interference mean that among the words appearing on the screen with the colors made different. Instructions given to respondents are to click buttons on the screen using the mouse in accordance with the written word that appears not the color of the word that appears. For example, for the word "RED" displayed in green, the expected answer is for the respondent to click on the red button. Respondents were given an explanation before testing, and given the opportunity to work on 10 trial questions. Then, the respondent did 100 real test questions.

Between the first test and the second one were given a gap of at least two days so that a brain wash occurred (the respondent is free from the effects of the first test). The second test, respondents used fidget spinner. Respondents get the same treatment as the first test.
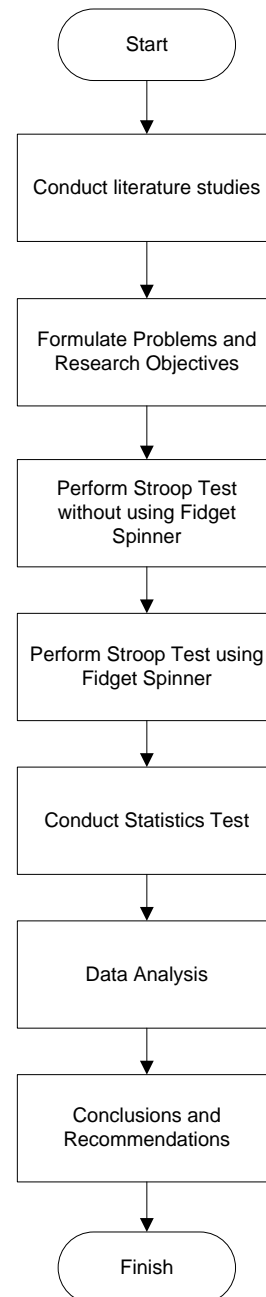

Figure 1. Research Methodology Flowchart

3.1. Population, Samples, and Sampling Technique
a. Sampling
   The sampling technique used is simple random sampling. In random sampling, each population unit has the same opportunity to be sampled. Simple random sampling can be reached by lottery, random number table, or by computer. In this study using a computer, namely with the help of Microsoft Excel software.
b. Number of samples
   Sekaran (1992) explains that for simple experimental research, with strict control, the sample size can be between 10 to 20 elements. This study is included in a simple experiment with tight controls because it uses simple sampling

techniques and optimal work environment control using space conditions. The number of samples in this study were 30 samples.

3.2. Research preparation

Performance measurement in this study uses the help of the stroop test, and the variables to be measured are the output and the number of errors. The more number of mistakes made, the smaller the level of accuracy, and vice versa, if the fewer the number of errors, the greater the level of accuracy. The study was conducted at the Work System and Ergonomics Laboratory (SKE) Universitas Atma Jaya Yogyakarta (UAJY).

3.3. Design of experiments

This study uses a completely randomized design, where the treatment is completely randomly applied to the experimental units or research subjects, so that the experimental unit is said to be homogeneous. Perfect random design is also called a single factor experiment, where there is only one treatment or factor. In this study the treatment is left hand condition (using fidget spinner and without fidget spinner). Figure 2 shows the fidget spinner used in this study.

Figure 2. Fidget Spinner Used

3.4. Selection of standard physical environmental conditions

This study uses the standard physical lighting conditions, temperature, and noise adjusted to the study conditions, which are as follows:

a. Information standards in Indonesia have been set in the Minister of Labor Regulation (PMP) No. 7 of 1964. The lighting standards used are roughly the same as international standards, namely the US standard 1680 for Interior Lighting which regulates the intensity of lighting according to the type or nature of the work. In accordance with these standards, it is explained that the lighting for work that distinguishes small items rather thoroughly has at least a lighting intensity of 200 lux.

b. Tarwaka et. al. (2004) recommend about criteria for comfortable temperatures; Acceptable indoor temperatures are between 20-24°C for winter and 23-26°C for summer. Indonesia is a tropical region which has a hotter temperature with a much higher humidity, so the recommendations from NIOSH need to be corrected if applied in the tropics. Based on research for air-conditioned rooms, it is recommended to set a temperature between 24-26°C as a comfortable temperature or a difference in temperature inside and outside the room no more than 5°C. This study uses a condition room in the SKE laboratory that uses AC as a room temperature regulator. Based on the explanation above, this study uses a standard temperature between 24-26°C.

c. Permissible noise occurs in a work environment condition based on Minister of Manpower Decree No. 51 of 1999 which is adjusted from work time per day.

3.5. Tools and media

The tools and media used in this study are as follows:

a. Laptop and speaker
b. Fidget spinner
c. Sound-level meter, Hi-lux meter, and termometer
d. Stopwatch
e. Design tools software
f. Minitab 16 software

3.6. Data collection

Data collection is done by experimenting with respondents. Data from each respondent was taken five times replication. The data obtained in the form of quantitative data, namely Reaction Time for Correct Answer (RTCA), which is the amount of reaction time in answering correctly divided by the number of correct answers (Soetisna and Tania, 2016).

At this stage, the data that has been obtained will be processed and analyzed. Data processing uses parametric statistical methods because this research data is quantitative. The statistical tool used in parametric statistics in this study is the average comparison test, or better known as the T-test. The T-test used was a paired sample T-test because it wanted to compare the average output results with the number of errors of the same subject, but it experienced two different conditions namely conditions without using fidget spinner and using fidget spinner. Assumptions for paired T-tests are normally distributed data and the variance values that can be the same or not. In this study, data analysis was assisted by using Minitab 16 software.

4. RESULT AND DISCUSSION

4.1. Research result

Data was collected on March 5-29, 2018 in the SKE laboratory room. The room temperature is set at 25°C, the light intensity is 200 lux, and the noise is 38 decibels.

4.2. Respondents

The population that will be used as research is Industrial Engineering students at Universitas Atma Jaya Yogyakarta. Respondents in this study were 30
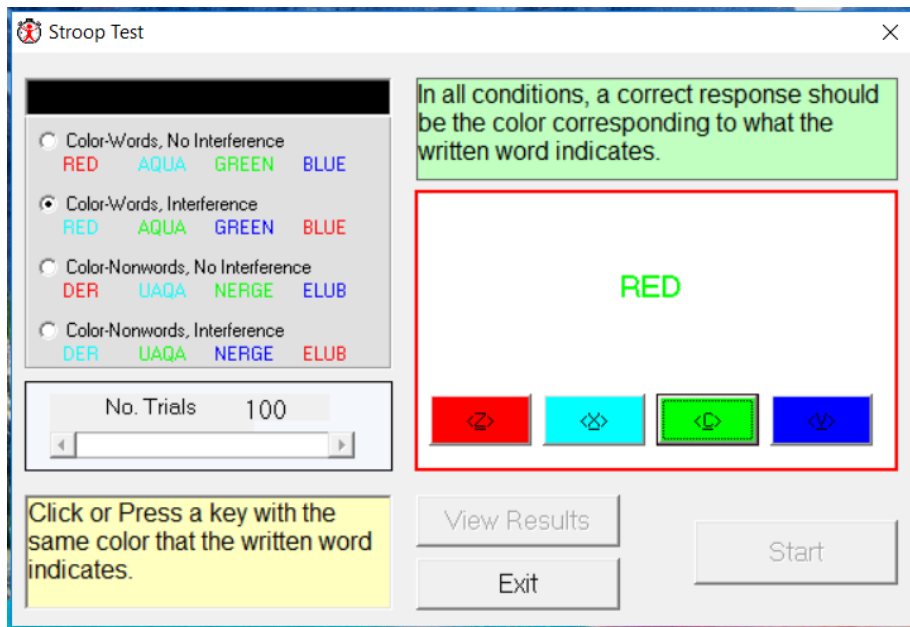
Figure 3. Interface of the Stroop Test

students with ages 19-21 years. 24 students were male and 6 students were female.

4.3. Procedure

Tests are carried out using the stroop test with color and word interference. Color interference and the word meaning are between the words that appear on the screen and the colors that make different. Instructions given to respondents are to click buttons on the screen using the mouse in accordance with the written word that appears not the color of the word that appears. For example, for the word "RED" which is displayed in green, the expected answer is that the respondent clicks on the red button. Figure 3 shows the interface of the Stroop Test used.

Respondents were given an explanation before testing, and given the opportunity to work on 10 experimental questions. Next, the respondent did 100 real test questions. Each respondent conducts two tests. The first test does not use spinner fidget, and the second test uses spinner fidget. Between the first and the second test were given a gap of at least two days to occur brainwash (respondents are free from the effects of the first test). Figure 4 is the first test image from the side. Figure 5 is the first test image from the back. Figure 6 is the first test image from the front.

Figure 7 is a second test image looked from the side. Figure 8 is a second test image looked from behind.

Figure 4. First Test Looks from The Side

Figure 5. The First Test Looks from The Back
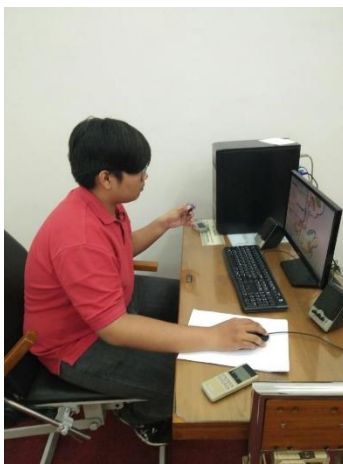
Figure 6. First Test Looks from The Front

Figure 7. Second Test Looks from The Side

Figure 8. The Second Test Looks from The Back

4.4. Research discussion

4.4.1. Paired T-Test at the average response time

Paired T-tests are used to determine whether the average of the two related samples is different. Paired T-tests were performed using Minitab 16 software, the following are the test steps.
1. Hypothesis parameter:

μ_1: the average response time does not use fidget spinner.

μ_2: average response time using spinner fidget.
2. Hypothesis formulation:

$H_0 = \mu_1 \leq \mu_2$

$H_1 = \mu_1 > \mu_2$
3. Significant level, $\alpha = 0.05$
4. Testing criteria:

H_0 is not rejected if P-Value $\geq \alpha$

H_0 is rejected if P-Value $< \alpha$
5. Test used: Paired T-tests
6. The results of the Minitab shown in Figure 9.
7. Decision: P-Value $(0.996) > \alpha$ (0.05), then H_0 is not rejected at $\alpha = 0.05$.
8. Conclusion: there is sufficient evidence that there is no difference in the average response time of treatments using fidget spinners and not using fidget spinners.

The results of the analysis of response time data using paired T-test concluded that there was no difference in the average response time between using a fidget spinner and not using a fidget spinner. This proves that the use of fidget spinner factors does not have a significant influence on differences in the results of measurement of response time.

4.4.2. Paired T-Test on average error

Paired T-tests are used to determine whether the average of the two related samples is different. Paired T-tests were performed using Minitab 16 software, the following are the test steps.
1. Hypothesis parameter:

μ_1: average error when not using fidget spinner

μ_2: average error when using the fidget spinner
2. Hypothesis formulation:

$H_0 = \mu_1 \leq \mu_2$

$H_1 = \mu_1 > \mu_2$
3. Significant level, $\alpha = 0.05$
4. Testing criteria:

H_0 is not rejected if P-Value $\geq \alpha$

H_0 is rejected if P-Value $< \alpha$
5. Test used: Paired T-tests
6. The results of the Minitab shown in Figure 10.
7. Decision: P-Value $(0,992) > \alpha$ $(0,05)$, then H_0 is not rejected at $\alpha = 0.05$.
8. Conclusion: there is sufficient evidence that there is no difference in the average error when neither using the fidget spinner or using the fidget spinner.

The results of the analysis of the average error data used paired T-test. It was concluded that there was no difference in the average error between not using fidget spinner and using finger spinner. This proves that the use of spinner fidget does not have a significant influence on differences in the measurement results of the dependent variable that is done on not using fidget spinner and also using fidget spinner.

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2018 12:21:08 AM ─────────────────────────────

Welcome to Minitab, press F1 for help.
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Paired T-Test and CI: Rata T respon, Rata T respon_1

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Paired T for Rata T respon - Rata T respon_1

                   N     Mean    StDev   SE Mean
Rata T respon     30   1.1809   0.2488   0.0454
Rata T respon_1   30   1.2927   0.2831   0.0517
Difference        30  -0.1118   0.2125   0.0388


95% lower bound for mean difference: -0.1777
T-Test of mean difference = 0 (vs > 0): T-Value = -2.88  P-Value = 0.996
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Figure 9. The results of Minitab for Paired T-Test at the average response time

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Paired T for rata error - Rata error_1

                N     Mean    StDev   SE Mean
rata error     30   1.1854   0.2390   0.0436
Rata error_1   30   1.2758   0.3046   0.0556
Difference     30  -0.0905   0.1942   0.0355


95% lower bound for mean difference: -0.1507
T-Test of mean difference = 0 (vs > 0): T-Value = -2.55  P-Value = 0.992
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Figure 10. The results of Minitab for Paired T-Test on average error

5. CONCLUSIONS AND RECOMMENDATIONS

5.1. Conclusions
From the results of the research that has been done, the researcher can draw the following conclusions:
a. The use of fidget spinner does not have a significant effect on the difference in the results of response time measurements.
b. The use of fidget spinner does not provide a significant difference in average error between not using fidget spinner and using fidget spinner.

5.2. Recommendations
Suggestions for future research:
a. Concentration testing is done with other test methods to see if there are differences in results with the stroop test.
b. Testing with different types of fidget spinner, for example in the form of a cube (fidget cube).

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