



RESEARCH ARTICLE

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**Duration of Gadget Usage Affects Eye Fatigue in Students Aged 16-18 Years**

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ABSTRACT

Gadget is one of the innovations generated by humans in order to simplify the work or for the benefit of everyday because with gadgets will easily get various kinds of information needed with a single press. Gadgets easily accessible by everyone one of them is a student or schoolchild so that it is possible for school children have complaints on the eyes if too concentrated on gadgets. Student should know Factors associated with vision complaints such as gender and length of use of gadgets in a day. The purpose of this study was to determine the effect of long use of gadgets against eye fatigue. This research is analytic observational with cross sectional method. The population in this study were all students in SMA Zainul Hasan Genggong Probolinggo which used gadgets as many as 296 students. A large sample calculation using the formula Isaac and Michael, amount to 165 students. Sampling technique with simple random sampling and carried out in August 2017. To determine the effect of the long use of gadgets against eye fatigue is used chi-Square test. The results of this study as many as 58 respondents who long using gadgets and fatigue, 22 respondents used gadget for < 2 hours, 3 respondents used gadget 2-3 hours, 5 respondents used gadgets for >3-4 hours, 4 respondents used gadget for > 4-6 hours, 23 respondents used gadget for >6-8 hours, and 1 respondents used gadget > 8 hours. then. Respondents who long used gadget and did not experience some eye fatigue 107 respondents, 43 respondents used gadget for < 2 hours, 30 respondents used gadget 2-3 hours, 20 respondents used gadget for > 3-4 hours, 3 respondents used gadget for > 4-6 hours, 9 respondents used gadget for >6-8 hours, and 2 respondents used gadget > 8 hours. Chi-Square result is taken data P value < 0,00 with  $\alpha$  significance 0,05 so it takes conclusion H1 received if P value <0,05 it means there is an effect of long time usage of gadget against eye fatigue in SMA 1 Zainul Hasan Genggong Probolinggo. Technological innovation is made in the purpose in order to simplify all human affairs hence from the human unknowingly also exposed negative impact of the use of gadgets one of them is eyestrain

**Keywords:** Duration, Gadget usage, Eye fatigue

INTRODUCTION

Background

Technology is the result of human innovation from the demands of globalization era. The latest innovation in technology is the rise of gadgets. Almost all circles and layers of society using gadgets either children, adolescents, adults to parents. Parents' unconsciousness of their children is introducing gadgets to them before the right time and this recognition is still too early for them, because when children or preschools are supposed to play more games related to physical, intellectual, fantasy to use to improve brain development and the growth of their bodies (Suherman, 2012).

Gadgets can be the biggest problem in this era of globalization, when parents take the initiative to give and buy gadgets to their children because they are busy working so that parents assume that in their absence the children will not feel lonely so they will be at home even if their parents are not home. Another factor that causes children to use gadgets is if a child using gadgets means they are among the upper middle class because their parents can afford to buy gadgets, unconsciously the parents will happily buy their children gadgets because they feel from medium and above without thinking about the consequences that will be generated by the use of the gadget itself (Suherman, 2012).

According to Firdaus (2013) if too long to use the gadget would have a negative impact on the health of the organs of the user especially the eye. The use of gadgets that are too long in addition to the use of the first by

user so impressed gadget users are forced to immediately adapt will certainly have an impact on his eyesight, by the American Optometry Association mentioned Computer Vision Syndrome (CVS), or commonly called by another name of eyestrain. VDT (Video Display Terminal) is the eyestrain that occurs because the gadget user takes too long to face the gadget screen.

Carayon in Sundari (2011) argued, from the results of studies obtained if people are gadget users will experience eye fatigue, if too long to use the gadget would happen another complaint that is the user gadget complained of eye fatigue as much 75-90%, while muscle fatigue (musculoskeletal) by 22%. This coincided with Hapsari opinion (2012) if eyestrain or sensory perception is the impact of the use of gadgets.

According to Occupation Safety and Health Administration (OSHA) in the United States reported VTD sufferers (Video Display Terminal) as many as 40 million users, 80% have CVS disorder (Computer Vision Syndrome). Complaints that occur in a short time such as blurred vision, headache, double vision and others (pheasant in firdaus 2013), pravelansi if people use the gadget experience eye fatigue of 70-90% do repeated activity in doing the task compared with if people do not use the gadget by 45%. Carayon in Sundari (2011) argued, from the results of studies obtained if people use gadgets will experience eye fatigue, if too long to use gadgets would happen another complaint that users complain of fatigue gadgets eyes 75-90%, while muscle fatigue (musculoskeletal) by 22%. This coincides with the opinion of Hapsari (2012) if eye fatigue or senses are the impact of the use of gadgets.

The role of parents is very influential on the maturation of students in order to be wiser again in using the gadget as well as in schools that must participate in limiting students in the use of gadgets. The role that parents and teachers can do is to provide information about the adverse effects, especially on eye health, especially when used in excess and in the end will also interfere with learning activities at school.

### METHODS

The purpose of this study was to determine the effect of long use of gadgets against eye fatigue. This research uses quantitative approach with observational analytic research type. Quantitative research was conducted to analyze the length of use of gadgets against eye fatigue. Researchers provide questions, observations and documentation on respondents without intervening or giving treatment to respondents. Based on research time, this research use cross sectional because independent variable (independent) long time usage of gadget and dependent variable (dependent) that is eye fatigue researched at the same time. This research was conducted in SMA Zainul Hasan Genggong Probolinggo in august 2017.

The population in this study was all students who have gadgets in SMA Zainul Hasan Genggong Pajarakan Probolinggo is 298 students. The calculation of sample size using Isaac and Michaelseum formula was known as 165 students. In this research the sampling technique used was simple random sampling was the selection or sampling / respondents members of the population done by randomized without looking at the strata in the population (Sugiyono, 2015). Researchers scramble the names of students who had the gadgets without differentiating the class. After the name of students had reached 165 students then the names were made respondents

$$s = \frac{\lambda^2 \cdot N \cdot P \cdot Q}{d^2 (N - 1) + \lambda^2 \cdot P \cdot Q}$$

$\lambda^2$  with  $dk = 1$ , the level of error can be 1%, 5%, 10%.  
 $P = Q = 0.5$ .  $d = 0.05$ .  $s =$  total sample

Information :

- $s$  = Total sample
- $\lambda^2$  = Chi Squares whose price depends on the degree of validity and error rate. For degrees of freedom 1 and error 5% price Chi quadrate = 3.841.
- $N$  = Population
- $P$  = Right Opportunity (0.5)
- $Q$  = Wrong Opportunity (0.5)
- $d$  = the difference between the expected sample and what happened.  
 Differences can be 1%, 5% and 10%

$$s = \frac{3.841^2 \cdot 296 \cdot 0.5 \cdot 0.5}{10\%^2 (296 - 1) + 3.841^2 \cdot 0.5 \cdot 0.5}$$

$$s = \frac{1098.875}{6.66} = 164.996$$

Then the samples size was 165 students

Data collection used in this research was using questionnaire, measurement and documentation. Tool to obtain data from the questionnaires distributed to respondents to be answered in accordance with the circumstances or know the real conditions experienced respondents. Data analysis techniques in this study were conducted with the help of SPSS computer application program. Univariate analysis was used to describe the characteristics of each research variable (Sugiono, 2015), namely sex, class, age, vision, complaints, snellen card examination, duration, rest pattern, type of gadget used, eye complaints when using gadgets. After univariate analysis the results will be known the distribution of each variable and can be continued bivariate analysis to find the effect between independent variables and dependent variable by using statistical test. To know the effect of using gadget to eye fatigue, Chi-square analysis was used.

**RESULTS**

Table 1. Frequency distribution of respondents based on sex

No.	Gender	Frequency (f)	Percentage (%)
1	Male	90	54.54
2	Female	75	45.45
	Total	165	100

Based on Table 1. that most respondents were male sex with the number of 90 respondents (54.54%)

Table 2. Frequency distribution of respondents by class

No.	Class	Frequency (f)	Percentage (%)
1	X Class	60	36.37
2	XI Class	51	30.90
3	XII Class	54	32.73
	Total	165	100

Based on table 2. above, it was found that the most class was X class totally 60 respondents (36.37)

Table 3 Frequency distribution of respondents by age

No.	Age	Frequency (f)	Percentage (%)
1	16	74	44.8
2	17	41	24.8
3	18	50	30.3
	Total	165	100

Based on Table 3. found that the most age type was 16 years as many as 74 respondents (44.8%)

Table 4. Frequency distribution of respondents by type of impaired vision

No.	Type of interference	Frequency (f)	Percentage (%)
1	If you see > 6 meters	116	70.3
2	If viewing less than 6 meters	49	29.7
	Total	165	100

Based on table 4. it was found that the most visible type of vision was seen > 6 meters as many as 116 respondents (70.30%).

Table 5. Frequency distribution of respondents based on old using gadgets

No.	Child's age	Frequency (f)	Percentage (%)
1	< 2 hours/ a day	4	2.4
2	2-3 hours/ a day	27	16.3
3	> 3-4 hours/ a day	36	21.8
4	> 4-6 hours/ a day	52	31.5
5	> 6-8 hours/ a day	35	21.2
6	> 8 hours/ a day	11	6.6
	Total	165	100

Based on table 5. it was found that the old use of gadgets >4-6 hours/ a day as many as 52 respondents (31.5%).

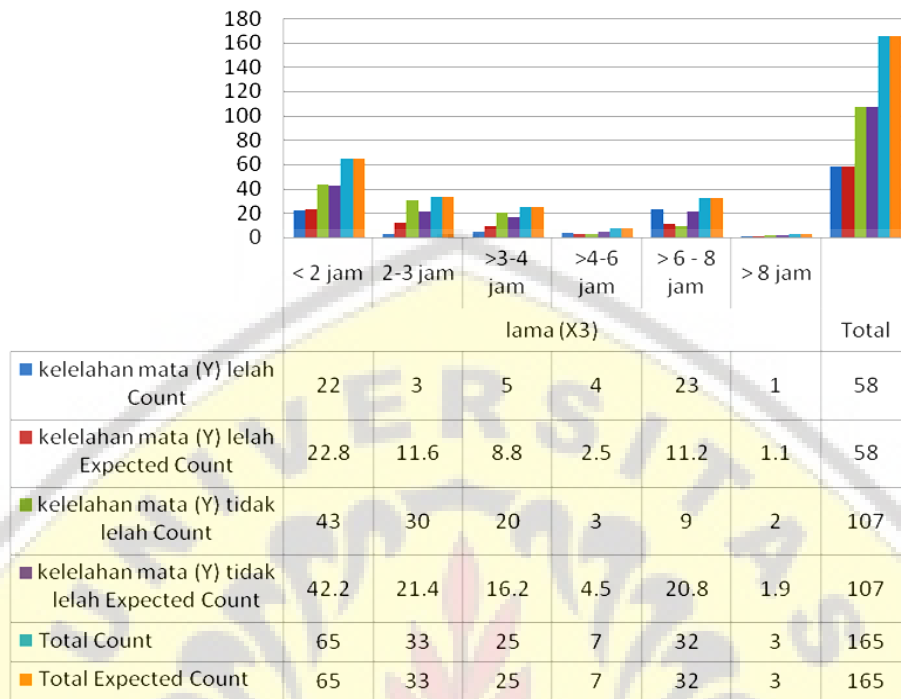


Figure 1. Distribution of gadget usage on eye fatigue

Based on Figure 1 in getting that the old respondents use of gadgets and eyestrain a number of 58 respondents, 22 respondents using gadgets for <2 hours, 3 respondents using gadgets 2-3 hours, 5 respondents using gadgets for > 3-4 hours, 4 respondents using gadgets during > 4-6 hours, 23 respondents using gadgets for > 6-8 hours, and 1 respondents using gadgets > 8 hours. While respondents old use of gadgets and do not experience eyestrain a number of 107 respondents, 43 respondents using gadgets for <2 hours, 30 respondents using gadgets 2-3 hours, 20 respondents using gadgets for > 3-4 hours, 3 respondents using gadgets for > 4 -6 hours, 9 respondents using gadgets for > 6-8 hours, and 2 respondents using gadget > 8 hours.

Table 6. the effect of long-time use of gadgets against eye fatigue

	Value	df	Asymp Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)	Point Probability
Pearson Chi-Square	32.820 <sup>a</sup>	5	0.000	0.000		
Fisher's Exact Test	33.153			0.000		

a. 4 cells (33.3%) had expected count less than 5. The minimum expected count is 1.05.

b. The standardized statistic is -3.613.

According to Table 6, Chi-square test showed that 4 cells (33.3%) should have a minimum calculation result of less than 1.05 so that this does not qualify for chi-square test so that the test results were Fisher's Exact Test p value 0.000 data with  $\alpha$  significant level of 0.05 so it can be concluded H1 accepted if the price of p value <0.05 which means there is long influence using gadget against eye fatigue in SMA Zainul Hasan Genggong Probolinggo.

## DISCUSSION

### Older Level of Student Gadget Usage in SMA 1 Zainul Hasan Genggong Probolinggo

Result of this research 3.5 obtained respondents most use gadgets in one day a number of 52 respondents, for > 4-6 hours ad day. A number of researchers have shown that vision symptoms occur in 75-90% of computer users. Bausch and Lomb reported that nearly 60 million people suffer from eye or vision problems due to

computer-based work and a million new cases are reported each year. Many people who have very mild visual abnormalities but do not cause any symptoms when performing jobs that require lower vision ability. The cause of the symptoms is a combination of pre-existing vision problems, poor workplace conditions, and unhealthy work habits. The survey also concluded that two-thirds of complaints are related to vision problems. In the same environment it has also shown that visual complaints occur more frequently in monitor users than users who do not use monitors (Affandi, 2005)

Not all respondents use gadgets with very long usage time, as in the research result that there are 4 respondents (2.4%) using gadget less than <2 Hours / day

### User Gadget Eye Fatigue Complaint in SMA 1 Zainul Hasan Genggong Probolinggo

The results in Table 3.6 show that 58 respondents (35.15%) have eyestrain, when using gadgets and 107 respondents (64.84%) do not experience eye fatigue when using gadget. Long-term use of the computer is at risk for tired eyes or asthenopia. According to data from world health organizations (WHO) asthenopia incidence rates ranged from 40 percent to 90 percent. Asthenopia is a symptom caused by the excessive effort of the vision system that is in a less than perfect condition for obtaining visual awareness. This disorder is characterized by blurred vision, blurred, double, diminished vision ability, red eyes, sore, itching, tension, drowsiness, reduced ability of accommodation and accompanied by symptoms of headache (affandi, 2010)

Not all respondents experiencing eye fatigue was shown a number of 116 respondents (70.30%) did not experience interference vision of the results of examination snallen card. Eye fatigue one of them comes from pupil fatigue. The pupils function to regulate the incoming light by shrinking if the light is too bright or widened if light is lacking. Camera diagram works like a pupil. The lens arranges for the shadow to fall right in the retina. Retina or mesh, is a thin tissue inside the eyeball. In the retina there are millions of nerve cells known as stem cells and cone cells. The stem cells allow us to see in a dark light state while conical cells help to see the details of light, such as reading, and seeing colors (Wahyono, 2008).

### The Old Effect of Using Gadgets Against Eye Fatigue in SMA 1 Zainul Hasan Genggong Proboinggo

From the results of this study indicate that the long use of gadgets does affect the eyestrain in SMA Zainul Hasan Genggong Probolinggo. But not all students with long use of gadgets will experience eyestrain, this is indicated from the study obtained long usage for five hours = 4.281 which means someone who uses gadgets for five hours a day will be at risk of eye fatigue four times compared with those who do not use during five hours

In Indonesia complaints of eye fatigue in workers who use computers often found. The results of research Setiawan (2012) conducted on workers who use computers in PT Surveyor Indonesia showed that as many as 83.7% have complaints of eye fatigue.

Technology is created because it has benefits that can help or facilitate human in life. Wawan Syahroni (2015) suggests some benefits of gadgets, among others; as a means of communication, to seek information, knowledge, etc. but students as respondents mostly do not use gadgets to increase knowledge but they use for other purposes such as games or social media.

### CONCLUSION

Based on the result of this study, it could be concluded that eye fatigue affected by the long duration by eye usage. It is expected to use the gadget more wisely to avoid eye fatigue, especially if using the gadget in a long time, when using gadget set the distance breaks your eyes do not get tired quickly. It is recommended to create rules in using gadgets within the school environment, In order to provide negative impact information in using gadgets. They can play an active role in controlling the use of gadgets to the son / daughter, Limit the use of gadgets inside the house

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