International Journal of Natural and Health Sciences (IJNHS)
Vol.2, No.1, 2024: 67-72

Limitation the use of Laptops when Online Learning Reduce the Eye Fatique of Private Junior High School Students in Denpasar

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A R T I C L E I N F O

Keywords: Eye, Fatique, Students, Laptop

Received : 3 December
Revised : 18 December
Accepted : 20 January

A B S T R A C T

The emergence of eye fatique in junior high school students during the online learning process is caused by the length of time the eyes stare at the laptop for a long time. In addition, the presence of more sophisticated learning media, the position of the laptop is very important and has a main function in supporting the online learning process. From a preliminary study conducted on 10 students from a private junior high school in Denpasar, it was found that 50% of students experienced complaints of dizziness, 50% glare and 20% sore eyes. With the above background, a study with the same subject design was conducted involving 25 students with an age range of 13-14 years. The study was conducted for 3 consecutive days, namely on Tuesday, Wednesday and Thursday by measuring eye fatigue using an eye fatigue questionnaire. The data were analyzed using the t-paired test at a significance level of p = 0.005. After using the laptop was limited according to the radiation exposure time from the appropriate laptop, the eye sight distance to the monitor screen was set 50-100 cm and interspersed with pauses or rest periods then the average eye fatigue in students before the improvement of 22.54 can be reduced to 5.25 or about 71%. Conclusion: From the research, it was concluded that limiting the duration of using laptops during online learning can reduce students' eye fatigue

DOI: https://doi.org/10.59890/ijnhs.v2i1.1173
E-ISSN: 3025-9665
https://journal.multitechpublisher.com/index.php/ijnhs

INTRODUCTION

During the Covid-19 pandemic, learning that was previously carried out face-to-face or offline, since the pandemic now all learning is online. This change was followed by several changes in student behavior and attitudes. So students will be in front of the laptop by staring directly at the laptop screen for a long time. This raises complaints in the eyes of students. From a preliminary study conducted on 10 students from a private junior high school in Denpasar, it was found that 50% of these students experienced complaints of dizziness, 30% glare and 20% eye pain. The occurrence of eye fatigue as a result of continuous eye strain when participating in online learning so that the discomfort caused can increase the burden of learning, reduce learning performance, increase the frequency of errors, and interfere with concentration.

Online learning makes teachers and students use laptops for a longer duration than usual, both used for learning or making assignments. For three to four hours looking at a laptop, without paying attention to the ideal distance, the appropriate size of text or images and videos, and pauses or breaks certainly cause complaints, such as eye strain, fatigue, headaches, blurred vision, neck pain, back pain and eye irritation. Therefore, eye complaints that are felt are also caused by several factors, including vision problems in students, improper study stations and poor study habits. These conditions are certainly not in accordance with the concept of ergonomics which seeks to improve the quality of physical and mental well-being, create safe, comfortable and healthy working conditions in order to achieve increased productivity, reduce the number of work-related accidents and fatigue. The application of ergonomics means the application of correct human work behavior in the work environment. Ergonomics can be applied in work aspects, such as: work position, work process, workspace layout and how to lift the load. The usefulness of implementing ergonomics is to improve performance, reduce excessive work energy, reduce fatigue, reduce wasted time, reduce equipment damage caused by human error and improve comfort at work.

The National Institute for Occupational Safety and Health (NIOSH) VDT Studies and Information states that you should take a 15-minute break from using a computer for 2 hours. This anticipates the occurrence of fatigue so that it adds comfort for computer users as well as the use of laptops. When students use laptops for a long time and continuously focus on the laptop screen, the ciliary muscles in the eyes will contract so that over time the eyes will feel tired and tense. Staring at the laptop screen causes the frequency of blinking to decrease the same as positioning the eyes lower than the laptop screen [3].

The purpose of this study was conducted to determine eye fatigue experienced by students during online learning before and after repairs were carried out by limiting the duration of laptop use and adjusting the eye distance to the laptop and providing rest can reduce eye fatigue so as to provide knowledge and contribute ideas for improving learning facilities and media which is done online so that it is more ergonomic, especially in using laptops for junior high school students during online learning.

LITERATURE REVIEW

Ergonomics comes from the words ergon and nomos, namely effective, efficient, comfortable, safe movement that does not cause fatigue and accidents according to the body's capabilities but produces optimal work. Ergonomics is a science related to adapting tools to human abilities to achieve maximum possible productivity (Sedarmayanti, 1996:1). Meanwhile, according to Suma'mur, 1989:1, ergonomics is "a science whose application seeks to harmonize work and the environment for people or vice versa, with the aim of achieving the highest productivity and efficiency through optimal use of human factors." According to Iftikar Z. Sutalaksana in Junaidi (2010), ergonomics is a systematic branch of science that uses information about human characteristics, abilities and limitations to design a system so that people can live and work in that system well, namely achieving desired goals. desired through that work, effectively, safely and comfortably.

The application of ergonomics means the application of correct human work behavior in the work environment. Ergonomics can be applied to work aspects, such as: work positions, work processes, work space layout and how to lift loads. The benefits of applying ergonomics are improving performance, reducing excessive work energy, reducing fatigue, reducing wasted time, reducing equipment damage caused by human error and improving comfort at work.

In general, the aim of implementing ergonomics is to improve physical and mental health through efforts to prevent work-related injuries and illnesses and reduce mental workload by seeking promotions and job satisfaction. The main focus is humans, where the tools and equipment are adjusted to human limitations and abilities so that humans at work do not experience the things mentioned above. Another goal of ergonomics is to improve social welfare and create a good quality of work and quality of life.

METHODOLOGY

This experimental research uses the same subject design (treatment by subject design). This research model uses the washing out method to eliminate the effect of previous treatment. The research was conducted at a private junior high school in Denpasar. Based on Colton's formula, the number of samples that were selected and met the inclusion criteria was 25 people and did not require a draw because the number of students in grade 7 junior high school was 25 people. Data collection was carried out before and after repairing the duration of laptop use, adjusting the eye distance to the laptop screen and interspersed with a 15-minute rest break by filling out eye fatigue questionnaires before and after repair.

Descriptive analysis of eye fatigue data and data normality test with the Kolmogorov-Smimov test at a significance level of 5% on the eye fatigue score. Comparative analysis of pre and pre with a different test in the form of a paired t test at a significance level of 5% if the data is normally distributed, but if the data is not normally distributed it will be tested with the Wilcoxon test at a significance level of 5% (a = 0.05). Analysis of the effect before and after improvement, post in phase 1 and post in phase 2 using paired t test.

RESULTS

The results of the analysis of 25 grade 7 junior high school students showed that the mean age of the subjects was 13.80 with an age range of 13-14 years. This age range is the appropriate age range for students as evidenced in the student's student card.

Table 1. Characteristics of Grade 7 Junior High School Students

No	Variable	Span	Mean	Standard Deviation
1	Age (Th)	13 – 14	13,80	0,34
2	Weight (Kg)	32 – 80	49	12,79
3	Height (cm)	154 – 173	162,62	5,65

Table 2. Differences in Grade 7 Students' Eyestrain Before Treatment I and Before Treatment II

No	Group		Mean	SB	T	P
1	Before treatment I (Early study)	Before	20,35	3,41	0,35	0,73
2	Before treatment II (Early study)	After	20,08	1,60		

In the results of the eye fatigue questionnaire before repair was carried out, namely treatment I by limiting the duration of laptop use and interspersed with 15 minute rest breaks if the duration of laptop use is more than 2 hours. While the improvement in treatment II is to adjust the visibility of the eye to the laptop screen 50-100 cm. Improvements to the limitation of laptop use for a maximum of 2 hours per day, obtained a mean difference from 20.35 to 20.08 and a standard deviation from 3.41 to 1.60.

Table 3. Differences in Grade 7 Students' Eyestrain After Treatment I and After Treatment II

No	Group		Mean	SB	T	P
1	After treatment I (Early study)	Before	41,88	5,35	13,90	0,00
2	After treatment II (Early study)	After	26,35	2,70		

The results of the study showed that there was a decrease in eye fatigue after repairs where treatment I was the duration of laptop use and interspersed with 15 minutes of rest breaks if the duration of laptop use was more than 2 hours. Treatment II is to adjust the visibility of the eye to the laptop screen 50 – 100 cm. It was obtained that the mean and standard deviation decreased from before and after the improvements were made by 41.88 to 26.35 and 5.35 to 2.70.

DISCUSSION

Eye fatigue is eye strain caused by using the eye senses for a long time accompanied by uncomfortable viewing conditions. Eye fatigue is also caused by not looking away 6 meters for a few seconds every 30 minutes using a laptop[5]. Research at the University of South Carolina categorizes computer use into three categories: light (less than 2 hours), moderate (2-4 hours), and heavy (more than 4 hours) per day[6]. The increase in eye fatigue that occurs in students is due to the use of laptops for a long duration and is not in accordance with the student's viewing distance and there is no rest so that the accommodation of the eyes becomes more maximum. So over time students feel tired, watery eyes and dizzy. Most students use laptops on average in a day is more than 5 hours. The National Institute for Occupational Safety and Health (NIOSH) VDT Studies and Information recommends taking a 15-minute break when using a laptop for a duration of 2 hours because if it is not interspersed with rest, it will cause symptoms of Computer Vision Syndrome (CVS)[7]. People who work with monitor screens will cause an increase in general fatigue by 37.29% and a decrease in work activities by 39.08%. This complaint also occurs in the use of laptops[8]. Giving pause or rest can reduce eye fatigue. The eye position that is suitable for using a laptop is to position the eyes higher than the laptop screen to reduce the frequency of blinking[9].

The recommended distance to be able to reduce the risk of developing CVS complaints is 50 – 100 cm[10] . During learning, students do not pay attention to the distance between their eyes and the laptop screen, so they never calculate the distance beforehand. Therefore, students must adjust the line of sight from their eyes to the laptop screen at an appropriate distance.

After the use of laptops is limited according to the radiation exposure time from the appropriate laptop and interspersed with pauses or rest periods of 15 minutes and adjusting the eye distance to the laptop screen 50-100 cm, the average eye fatigue in students before repair is 22.54 which can be reduced to 5.25 or about 71%.

CONCLUSIONS AND RECOMMENDATIONS

Improving the duration of laptop use by adjusting the distance between the laptop screen and the eyes and providing a 15-minute break can reduce student eye fatigue by 66.52% and is statistically significantly different ($p < 0.05$). Therefore, in online learning it is important to make an agreement with the school so that the learning time is not more than 2 hours or it can be more than 2 hours but interspersed with breaks or rest periods of at least 15 minutes.

From this research, it is recommended that the duration of using a laptop is no more than 2 hours per day so as not to cause eye fatigue and in further research, it is necessary to make a difference in treatment for those who wear glasses and do not wear glasses, especially if the glasses can ward off radiation rays caused by laptops.

FURTHER STUDY

For further research can also be related to the comfort level of using a laptop where ergonomic comfort is a condition of feeling someone who feels comfortable based on individual perceptions and some people translate comfort in Indonesian as a relaxed condition, where you don't feel pain throughout your body. By feeling comfortable, it creates feelings of pleasure and happiness for the individual.

ACKNOWLEDGMENT

The authors thank profusely to the Rector of Bali International University and the Coordinator of Occupational Health and Safety Study Program who have provided the opportunity for the authors to conduct research and publish this research and do not forget to thank the authors also to the school represented by the Principal, homeroom teacher and students of private junior high school in Denpasar.

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