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## Environmental Influences Cause Stress on the Use of Computer

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### ABSTRACT

Working with a computer over a period long enough to be done. Computer is the best medium currently in appearance and in the way of working, because the computer can assist in completing the work in a more rapid, efficient and very easy to use. With the convenience offered by the computer, almost all the work can be done with computer. Computers are a necessity in supporting work and communication tool that is quite reliable. The computer is useful in life, but can also cause problems on users, the computer can issue radiation that affects the condition of the user as well as ignorance in using computers can cause Repetitive Strain Injury (RSI). Besides, the use of computers can lead to stress as a result of incomprehension in determining the condition of the environment on room. To be able to know the stress resulting from the use of computer, conducted research with a sample of 30 people at Udayana University Computer Science students with a design the same subject. Data analysis was performed with SPSS 13.00 and differences in the data before and after the redesigned (improvement), that do use the test independent sample t-test (t test group), at the level of significance of 5%. After a redesigned (improvement) on the environmental temperature is obtained decrease in the standard cold temperatures of Indonesia work of 28.00 C to 25.83 C, occupational stress decreased from 86% to 42%, and improve learning outcomes from 59.6% to 98.1%. Thus It can be concluded that due to improvements made against environmentally ergonomic standards can reduce the stress of work

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## 1. INTRODUCTION

The computer is a tool used to facilitate in resolving problems in the work. Many kind of computer equipment traded in the market and market share of this tool is very reaching of young children and to the elderly. Computers can be used to communicate remotely with each other at virtually unlimited distances at low cost. Computers were created in the form of a very interesting in many form, colors and sizes. The ability of computers continues to grow, to meet the criteria of the desire of market share. With the growing capabilities of computers and accessories that are owned, making the computer more interesting.

Computer lab in the Department of Electrical Engineering, University of Udayana use computers as a tool practicum for students who do practicum work. Many of the students who do not understand the use of computers is good and right, because in the wrong computer use can cause various problems such as Repetitive Strain Injury (RSI) and stress caused by work. Repetitive Strain Injury (RSI) is a potentially debilitating condition that the body functions repeatedly. Repetitive Strain Injury resulted from the hand that performs repetitive tasks, such as typing, writing, or clicking the mouse. Complaints in computer users

greatly affect the durability of the body, for that distances saw eye on computer should really be fully guarded, quickly so as not to experience fatigue. Stress from work can lower the immune system in humans, thereby also resulting decline in learning outcomes. The results of preliminary studies done and getting improved results of stress scores by 86%. For the sample used is 3rd semester student majoring of information engineering years 2008/2009, experiencing stress job problems on practicum in lab.

From the description above, there should be an improvement on the working environment in the laboratory that is used as a practicum student Information Engineering University of Udayana to obtain the expected learning outcomes. Redesign (repairs) done on the computer labs on the environment is to reduce the stress of work. Redesign is done based on rules is a condition of ergonomics to create a viable practical conditions and conducive. Feasible and conducive requirements are intended to produce practicum results based on the applicable provisions and achieve the required graduation rates in the Department of Informatics.

This research is expected to provide an explanation that by redesigning the computer lab against environment in the standard ergonomic can reduce stress and improve learning outcomes in student practicum in the Department of Informatics University of Udayana.

## 2. MATERIALS AND METHODS

The population in this study is the Student Information Engineering University of Udayana Denpasar with a population of 79 people, the usual used a computer. to determine the sample size determined by using the formula Colton (1985). From the calculation formula of the samples obtained by 26 samples. To avoid drop out then the sample plus 15%, so the samples to 30 samples.

Research by use the same research subjects (Isaac & Michael, 1971; Hadi, 1995; Bakta, 1997). Tools used in this study is a questionnaire to measure the level of stress is the stress caused by work subject to the Likert scale 1 to 7, Questionnaire fatigue eye is to measure the level of eye fatigue with the Likert scale 1 to 5. the thermometer made in Taiwan by Lin Tan units of degrees Celsius and the accuracy of 0.01 degrees Celsius, is used to measure the temperature of wet and dry temperature. Lux meter Sanwa brand made in Japan 0000-3000 1 lux lx with precision, to measure the intensity of light, Sound Level meter Lutron brand SAL-4001 series code 0149093 made in Japan with 1 dB accuracy, to measure the intensity of noise, Stop-Watch with Diamond brand with units of seconds and with accuracy 0.01 seconds used to calculate the pulse rate and psychometric chart to determine relative humidity. The study was conducted at the Department of Informatics University of Udayana with lab work done by students. Data is collected for 1 hour 30 minutes each day and be repeated 2 times on the following days and after the repair is done also in the same condition. The data obtained were processed and danalisis with SPSS for Windows program to test the hypotheses that have been determined in this study by testing the difference test environment data, eye fatigue, workload and stress due to work by using a test of independent sample t-test, at the level of significance of 5%.

## 3. RESULTS AND DISCUSSION

### 3.1. Characteristics of Subjects

Characteristics of the subjects in this study is the value of the average student age was  $18.97 \pm 0.81$  years with a range of 18 to 20 years. The mean body weight  $63.37 \pm 6.14$  kg with a range between 51 kg up to 75 kg and mean height  $167.87 \pm 4.69$  cm with a range between 156.4 cm up to 182 cm.

### 3.2. Environmental Conditions

Environmental conditions are the conditions at the time of the research activities.

Table 1. Analysis Test The Difference of Environmental Conditions in the Laboratory of Computer Department of Electrical Engineering

Variables	Before Redesign		After Redesign		The Mean Difference	Value t	Value P
	Mean	SD	Mean	SD			
Temperature of Dry (°C)	28,00	0,50	25,83	0,76	2,17	4,91	0,04*
Temperature of Wet (°C)	23,67	1,04	20,83	0,58	2,84	4,71	0,04*
Humidity (%)	72,67	4,04	62,17	0,58	10,50	5,25	0,03*
Noise (dB) (A)	33,87	8,07	33,77	7,63	0,10	0,30	0,78
The Light Intensity (lux) TL 2x36 watt	110,00	11,83	246,67	8,16	-136,67	-23,29	0,001*

Paired Samples T Test, ( $p < 0.05$ )

### 3.3. The temperature of the environment

The results of measurements temperatures in the lab with an area of 55.09 m and height 3.44 m obtained dry temperature before redesigning the average temperature of 28.00 C and dry temperature data obtained after the redesign is 25.83 C. Different test results showed a large value of  $p = 0.04$ . That means the dry temperature between before and after the redesign significantly different with  $p$  value  $<0.05$  experiencing decreased by 7.75%. With the obtained temperature 25.83 C in accordance with National Standards of Indonesia. This condition may affect the subjects at time learning such as comfort in the laboratory. These findings are in accordance with the report According to the National Standards of Indonesia 03-6572-2001 regarding the procedure of designing the ventilation system and air conditioning in buildings that thermal comfort zone of Indonesia for the design of the room is generally  $25 \pm 1$  C. With a temperature of 25.83 C was a standard value in accordance with National Standards of Indonesia. At this temperature standards are already being felt cold to work on hot temperatures in Indonesia.

Wet temperature is average of before the redesigned of 23.67 C and the wet temperature after redesigned is average 20.67 C. The analysis showed that the value of  $p = 0.04$ . That means the temperature of wet between before and after the redesigned significantly different  $p <0.05$ , decrease in temperature between the wet before and after the redesigned is equal to 12.67%. This condition may affect the subjects at the time of learning such as comfort in learning in the laboratory.

Average moisture before redesigned of 72.67% and average humidity after redesigned is 62.17%. This condition may affect the subjects the time of learning such as comfort in learning in the Laboratory. The findings are accordance with the findings from the research results the Center for Meteorology and Geophysics Agency Region III for the period June 2008 Denpasar, which is between 62 up to 92% (Bali Province, 2008). Humidity on the computer lab should be given due attention, in the lab was done practicum on the closed room, so there's no air circulation. This is so that moist air does not really affect the body of a subject who did practicum work in the room and can cause the condition of the body become weak because it is too moist.

### 3.4. Light Intensity

In the computer lab at the Department of Mechanical Elektro almost entirely uses electrical energy, because the position and layout of the room is not suitable to use the sun's rays. Conditions lighting before redesigned uses two lamps TL2x36 watt. The mean intensity of light produced at 110.00 lux and after redesigned lighting uses eight lamps TL2x36 watt, so that the light intensity obtained is 246.67 lux. The results of both the average intensity of light before and after the redesign significantly different with  $p$  value  $<0.05$ . The results of the light intensity is increased by 124.25%. Increased the intensity of light is intended so that the eyes do not tire quickly due to the intensity of light is less standard. This was evident in a computer lab can reduce eye fatigue 58%.

### 3.5. Noise

Noise is also a risk factor in the work, so the noise must be in standard conditions specified in the noise classification on the office (Manuaba, 1998). Noise must be controlled properly to be able to produce the expected working conditions. The results of the average noise before redesigned the computer lab amounted to 33.87 dB (A) and noise average after redesigned is 33.77 dB (A). Thus the noise level after the redesigned was also very quiet on the classification that is between 30-40 dB (A) (Manuaba, 1998). Ibach77 (2008) stated that the noise limits that make the work environment is comfortable at 60 dB (A). So the noise in this study, between before and after the redesign includes a category calm. Noise that occurs in this study do not affect the results of research because  $p > 0.05$  or before and after the redesigned is the same noise level.

Condition noise at computer lab which closed and far from the highway traffic does not affect the results of practicum. For that the condition the noise level be equal before and after practicum namely at the level of classification calm.

### 3.6. Occupational Stress

The results score average stress before practicum, and after the redesigned the lab is  $12.06 \pm 1.45$ . Before the practicum, and after redesigned is  $12.20 \pm 1.69$ . Both results show that the results are not different or comparable with to the value of  $p > 0.05$ . The results of the mean score of occupational stress before the redesigned of  $30.20 \pm 0.35$  (Total score  $> 24 =$  high degree of stress). After redesigned the stress level to be  $17.54 \pm 1.12$  (Total score of 10-24 = degree of stress being). Stress from work between before and after the redesign significantly different with  $p$  value  $<0.05$ .

Tabel 2. Hasil Analisis Stres Akibat Kerja (N=30)

Variables	Before Redesign		After Redesign		The mean difference	value of t	value of p
	Mean	SD	Mean	SD			
Of Occupational Stress Before Practicum	12,06	1,45	12,20	1,69	-0,15	-0,85	0,43
Of Occupational Stress After Practicum	30,20	0,35	17,54	1,12	12,66	32,46	0,001*
Difference	18,15	1,35	5,34	1,26	12,81	41,30	0,001*

Paired Samples T Test, (p<0.05)

This means the reduction of occupational stress is influenced by improvements in the laboratory. Decrease in stress due to work by 42% due to improvements made on the environment in the computer lab. Occupational Stress can affect the subject's body as the cause of human is not work on the state of nature. Stress is caused by the environment such as a lack of regulation at a temperature that causes fatigue and result in stress. Lack of light intensity that causes the worked in a way that does not naturally lead to stress and a computer practicum is done on the condition of monotony; this affects the incidence of occupational stress.

Condition lab which is not standard potentially be the cause of stress, difficulty concentrating and decreased work productivity. If the laboratory is not convenient, heat, air circulation is not inadequate, the room was too crowded by the people as well as the instruments of labor, the work environment is less clean, noisy, of great influence on the comfort of work that cause stress. Workplace conditions and work behaviors that are not naturally going to affect the hormone cortisol, causing stress.

#### 4. CONCLUSION

Based on the description of the above discussion can made conclusions as follows, that the redesigning the computer lab against environment which is ergonomic standards at Udayana University Engineering Department Elektro can reduce the stress of work.

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