International Journal of Innovation and Industrial Revolution
EISSN: 2637-0972
IJIREV
Volume 5 Issue 15 (December 2023) PP. 01-10
DOI 10.35631/IJIREV.515001

INTERNATIONAL JOURNAL OF INNOVATION AND INDUSTRIAL REVOLUTION (IJIREV)
www.ijirev.com

EFFECT OF WORKPLACE ERGONOMICS ENVIRONMENT ON HEALTH: A STUDY AMONG STUDENTS IN UUM

Siti Nurnadiera Hashim[1], Rosini Nawang Mustapen[2*]

[1] School of Technology Management & Logistics, Universiti Utara Malaysia, Kedah
Email: nurnadierahashim@gmail.com
[2] School of Technology Management & Logistics, Universiti Utara Malaysia, Kedah
Email: rosini@uum.edu.my
[*] Corresponding Author

Article Info:

Article history:
Received date: 18.07.2023
Revised date: 15.08.2023
Accepted date: 17.10.2023
Published date: 05.12.2023

To cite this document:

Hashim, S. N., & Mustapen, R. N. (2023). Effect Of Workplace Ergonomics Environment On Health: A Study Among Students In UUM. *International Journal of Innovation and Industrial Revolution, 5* (15), 01-10.

DOI: 10.35631/ IJIREV.515001

Abstract:

Ergonomics at the workplace is important in preventing workplace injuries and improve the work productivity. Consequently, promoting ergonomic workplace within the student's context is relevant to addressed. This research aims to identify the relationship of workplace ergonomics environment on health among final year students. A survey was carried out among final year students at the School of Technology Management and Logistics (STML), UUM. This study using a questionnaire as the main instrument for data collection. A total of 168 STML final year students were answers the survey. The questionnaire addresses the student's perception of ergonomic workplace experience (lighting, indoor air quality and workplace design) on student's health. Data analysis was conducted using SPSS software. The research discovered that students suffered from low back pain and neck pain during and after study at the workplace. This study concludes that, improper workplace design has a negative effect on student's health. Thus, this study contributes insight for ergonomic workplace from the student perspective.

Keywords:

Workplace Ergonomics Environment, Student Health, Workplace Design, Lighting, Indoor Air Quality

Introduction

Ergonomics developed in Europe around the 1850s and is currently practised in several other regions, including Asia, the North and South Americas, Africa, and Oceania (Fernandez, 1995). Ergonomics is the application of knowledge about human behavior, capabilities, and

International Journal of Innovation and Industrial Revolution
IJIREV
EISSN: 2637-0972
Volume 5 Issue 15 (December 2023) PP. 01-10
DOI 10.35631/IJIREV.515001

limits to the design of systems, equipment, tools, tasks or jobs, and environments for safe, productive, and efficient human use (Afroz & Haque, 2021). In Malaysia, ergonomics was introduced more than a decade ago, on 1st December 1992, when the National Institute of Occupational Safety (NIOSH) established its ergonomics branch. The ergonomics movement was initiated by foreign executives (such as those from Japan and the United States) working in Malaysia's multinational industrial businesses. They could see the benefits of ergonomics implementation in terms of improving the productivity, quality and Occupational Safety and Health (OSH) towards the employees when it was implemented. Consequently, they urged the local industry to embrace ergonomics. Today, ergonomics is not only practiced in industry but is widely practiced in various fields such as medicine, education and others.

According to Jaafar, Akmal, and Libasin (2021), ergonomics' objective is to guarantee a suitable fit between the comfort, safety, and health of the students and their productivity and efficiency. Jaafar et al. (2021) further clarified that ergonomics would aid in minimizing discomfort, strengthening muscles, and enhancing blood circulation. The primary objective of ergonomics is to enhance human comfort, safety, productivity, and efficiency by ensuring a good match between people and their jobs (Sirajudeen & Siddik, 2017). Lousy posture is known to lead to tiredness, stress, and a bad attitude at work and also puts humans at risk for musculoskeletal disorders and makes them less effective at their job (Ramesh et al., 2020). If a person has bad posture, they will have to face musculoskeletal disorders are problems with the muscles, tendons, joints, vertebrae, nerves, and blood vessels (Rizkya et al., 2018)

Previous studies were discussed ergonomics knowledge and practices (e.g., Jaafar, Akmal, and Libasin (2021); Mohammad, Abbas & Narges (2019). Although the topic of ergonomic knowledge has been previously explored, these studies were context-specific, and their implication is usually limited to where studies were conducted (Salleh, Fadzil, & Daud, 2020). Furthermore, ergonomics study from UUM students is remains scarce. By conducting this study, the intention is to contribute to extend the body of knowledge, offering more understanding of the effect of workplace ergonomics on student health in the education perspective.

Literature Review

Effects Of Workplace Ergonomics Environment on Health

This study arises from the need to manage the student's health effectively thru a workplace ergonomics environment. According to Ramesh, Divya & Anandkumar (2020), in the past two decades, the number of students with musculoskeletal disorders has grown by 25%, contributing to 2% of the worldwide illness burden. Musculoskeletal disorders (MSDs) can affect students' muscles, bones, and joints (Tholl, Bickmann, Wechsler, Frobose & Grieben, 2022). Khan, Surti, Rehman & Ali (2012) clarified that inadequate workstation design and bad posture are risks, as prolonged sitting causes poor circulation, joint stiffness, and pain. Indeed, continuous activity over long periods can raise the risk of injury, and repetitive strain injuries that build over time can cause long-term injury.

According to Yeow, Ng and Lim (2021), In Malaysia, ergonomics is still in its infancy and is evolving rather slowly in the fields of research, teaching, and community practice. This study is supported by Loo, Richardson & Alam (2012). They discovered that workplace ergonomics is still in its infancy in Malaysia due to a lack of ergonomics education. Therefore, ergonomics

International Journal of Innovation and Industrial Revolution
EISSN: 2637-0972
IJIREV
Volume 5 Issue 15 (December 2023) PP. 01-10
DOI 10.35631/IJIREV.515001

should be promoted so that the students become aware of the design concepts of an ergonomic workplace. In order to enhance the ergonomics environment, ergonomics programs should be implemented in education (Mustafa et.al, 2009). Hence, the students need to know the effects of an ergonomic environment in the workplace on health to implement ergonomics when they start working.

Importance of Good Workplace Ergonomics Environmental on Health

Tarcan et al. (2004) explained, a decent working environment and consideration of ergonomics in the workplace will raise student health and productivity. According to the literature, most researchers concur that an ergonomic workplace is critical in determining physical and mental health (Afroz & Haque, 2021). Low productivity, poor job quality, and physical and mental stress can all result from an ergonomically unsound workplace (Lewinski, 2015). Literature shows that ergonomics is essential regarding the link between mechanical exposure of the upper limb at work and problems like pain, numbness, and tingling in the wrist, shoulder, back, and legs, as well as eye strain (Patrick Neumann et al., 2018).

Another study by Limniou (2021) discoverd, students quickly feel tired, angry, and in pain, while studying with improper facilities and uncomfortable. Indeed, by making a student's workplace more efficient by making it easier to sit up straight and having good indoor air quality and lighting, the student can study more effectively. Thus, students' health and environment are directly related to their study satisfaction and indirectly to university commitment and turnover intention. Past study also proven that a suitable environment in the workplace can improve safety and health, student morale and satisfaction, quality of study, and competitiveness (Realyvásquez-Vargas et al.,2020). Whilst the finding by Yang et al. (2021), strengthen the current literature of ergonomics could change the work environment, boost productivity, and even make the student feel better when studying. In another word, workplace ergonomics environment is essential for students in assist them to prevent injuries and ensure students health. Therefore, this study proposed the following research framework as figured in Figure 1.

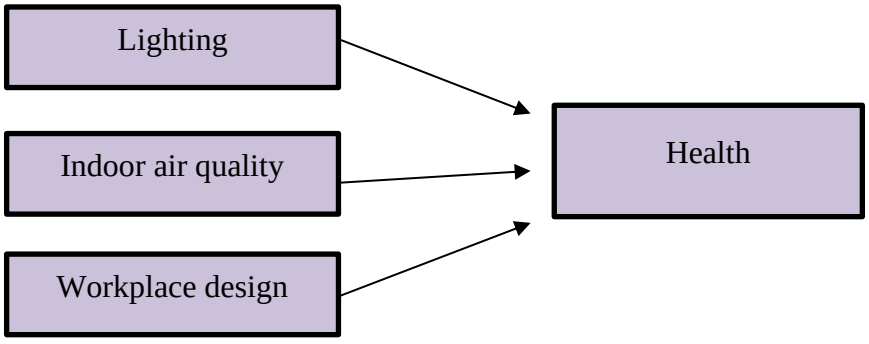

Figure1: Proposed Research Framework

Based on the research framework, this study attempts to test the following hypotheses:
H1: Lighting has a negative effect on students' health.
H2: Indoor air quality has a negative effect on students' health.
H3: Workplace design has a negative effect on students' health.

International Journal of Innovation and Industrial Revolution
EISSN: 2637-0972 IJIREV
Volume 5 Issue 15 (December 2023) PP. 01-10
DOI 10.35631/IJIREV.515001

Methodology

To address the purpose of research, this study employed a quantitative research design. A survey questionnaire was utilized to collect data using the google form. All the items were adapted from the previous studies and were distributed to final year students in STML. The final-year students were chosen as respondents as they were experienced in using the university facilities longer than others batch. The target sample size was 168, derived from Krejcie and Morgan (1970) sampling table based on the population of 300 STML final-year students. The questionnaire is divided into four sections: A, B, C, and D. This research used the Likert scale with a range of 1 to 5. Scale 1 to show strongly disagree and five strongly agree. The collected data were analyzed using version 27 of the Statistical Package for the Social Sciences (SPSS).

Results And Discussion

The demographic profile of the respondents is depicted in Table 1. The results show that 64.3% (108 people) of respondents are female, and 35.7% (60 people) are male. The percentage of Malay respondents is 57.1% (96 people), while the percentage of Chinese respondents is 25% (42 people). In addition, 17.3% of respondents are Indian, which is 29 people. The remaining 0.6% (1 person) of respondents indicated for others (Siamese. The respondents mostly are from the Technology Management course, which is 48.2% (81 people) and the second is the respondents from the Operation Management course, 26.2% (44 people). 25.6% of respondents are from Logistics and Transportation course, which is 43 people. Furthermore, most of the respondents who participated in the questionnaire have chosen their room in inasis as their workplace option, which is 50.6% (85 people). 27.4% (46 people) of respondents have chosen the library, and 22% (37 people) of respondents have chosen the inasis student lounge.

Table 1: Demographic Profiles

Item	Category	Frequency	Percentage (%)
Gender	Male	60	35.7
	Female	108	64.3
Race	Malay	96	57.1
	Chinese	42	25.0
	Indian	29	17.3
	Other	1	0.6
Course	Operation Management (PoM)	44	26.2
	Technology Management (MoT)	81	48.2
	Logistics and Transportation (LogT)	43	25.6
Workplace	Library	46	27.4
	Room (Inasis)	85	50.6
	Inasis student lounge	37	22.0

Each structure's Cronbach's alpha was evaluated after conducting a reliability investigation. A low alpha coefficient suggests that the project contributes little to measuring the interest structure. According to Pallant (2020), an Alpha Cronbach score above 0.6 is a reliable and appropriate indicator. In contrast, Alpha Cronbach values below 0.6 are deemed low (Nunnally & Bernstein, 1994). Alpha Cronbach readings within the range of 0.60 to 0.80 are acceptable yet moderate. In the pilot test, the valence items were found to be irrelevant to the factor. As

International Journal of Innovation and Industrial Revolution
EISSN: 2637-0972
IJIREV
Volume 5 Issue 15 (December 2023) PP. 01-10
DOI 10.35631/IJIREV.515001

shown in Table 2, all values of the variables in the final questionnaire were above 0.60, meeting Cronbach's Alpha acceptable value.

Table 2: Cronbach's Alpha Scores

Variables	No. of items	Cronbach's alpha
Lighting	4	0.750
Indoor air quality	4	0.757
Workplace design	4	0.742
Student health.	6	0.610

Table 3 presents the normality test using skewness, and kurtosis was performed to see the data distribution. In a normal distribution, skewness evaluates the symmetry or asymmetry of the data distribution, whereas kurtosis indicates whether the data has heavy or light tails. The result shows skewness value for students' experience of workplace ergonomics environment (0.405) and skewness for health (0.222). According to Hair et al., 2010, the acceptable range for skewness values is [-2, 2], and the acceptable range value for kurtosis is [-3, 3].

Table 3: Normality Test

	Students' experience of workplace ergonomics environment	Health
Skewness	0.405	0.222
Std. Error of skewness	0.187	0.187
Kurtosis	0.443	4.125
Std. Error of kurtosis	0.373	0.373

Table 4 shows the total mean and standard deviation for students' experience of the workplace environment. The student's experience of the workplace ergonomics environment is analyzed through three sub-variables: lighting and indoor air quality. To assist the interpretation of each variable's experience, this study classifies the experience into three categories (low, moderate, and high). The mean for each variable is presented in table 4. The results showed that lighting and indoor air quality are at a high level with the mean value of (M=3.99) and (M=4.22) with a standard deviation of (SD=0.254) and (SD=0.215); meanwhile, workplace design (M=3.70) with standard deviation (SD=0.32) and health (M=3.1319) with standard deviation (SD=0.34599) are at the moderate level.

Table 4: Mean and Standard Deviation

Variables	Mean	Standard Deviation	Level
Lighting	3.9970	0.25370	High
Indoor air quality	4.2247	0.21480	High
Workplace design	3.7024	0.32366	Moderate
Health	3.1319	0.34599	Moderate

Table 5 shows the mean scores of students' experience with workplace ergonomics lighting. The entire item for the students' experience on workplace ergonomics lighting at the high level except for the item "*I feel relaxed with the lighting available in my current workplace"* is at

International Journal of Innovation and Industrial Revolution
EISSN: 2637-0972
IJIREV
Volume 5 Issue 15 (December 2023) PP. 01-10
DOI 10.35631/IJIREV.515001

the moderate level (M= 3.78, SD=0.495). Most of the students agreed that they had a good experience with the lighting available in their workplace.

Table 5: Students' Experience in Workplace Ergonomics (Environment Lighting)

The students' experience in workplace ergonomics environment lighting.	Mean	Standard deviation	Level
I feel relaxed with the lighting available in my current workplace.	3.78	0.495	Moderate
My workplace has good lighting that helps me to focus while studying.	4.06	0.304	High
The lighting in my workplace is adequate.	4.07	0.339	High
I am satisfied with the colour of the light in my workplace.	4.08	0.424	High

Table 6 presents the overall items for students' experience of workplace ergonomics indoor quality. The total of 4 items is at a high level between the mean score of 4.02 to 4.66. These findings prove that STML final-year students had a good work experience with indoor air quality. Indoor air quality is essential because it can help students increase their concentration, improve their mood, and reduce stress.

Table 6: Students' Experience in Workplace Ergonomics Environment Indoor (Air Quality)

Students' experience in workplace ergonomics environment indoor air quality.	Mean	Standard deviation	Level
Good ventilation at work makes me comfortable to studying.	4.02	0.289	High
My workplace has good ventilation that helps me to improve my mood while studying.	4.66	0.487	High
My workplace has good ventilation that helps increase my concentration levels during study.	4.13	0.388	High
My workplace has good ventilation that helps me reduce my stress.	4.08	0.370	High

Mean value for each variable is presented in table 8. The entire item for the students' experience on workplace ergonomics workplace design is at the high level except for the item "*The study chair at my workplace is comfortable because the seat is soft, have neck support and armrest."* which is at the moderate level (M= 2.46, SD=0.947). Most of the students had a bad experience with the chair available at their workplace. Comfortable and supporting chairs contribute to the happiness and health of students, who are less prone to be distracted or have aches and pains.

Table 7: Students' Experience in Workplace Ergonomics Environment Workplace Design

Students' experience in workplace ergonomics environment workplace design.	Mean	Standard deviation	Level
The study chair at my workplace is comfortable because the seat is soft, have neck support and armrest.	2.46	0.947	Moderate
My workplace floor covering is suitable.	4.04	0.385	High

International Journal of Innovation and Industrial Revolution
EISSN: 2637-0972
IJIREV
Volume 5 Issue 15 (December 2023) PP. 01-10
DOI 10.35631/IJIREV.515001

The peaceful state of my workplace area helps me to study in peace.	4.22	0.444	High
The colour of my workplace wall makes me feel calm.	4.09	0.499	High

This study also wanted to identify the students' experience of workplace ergonomics on health. The mean for each variable is shown in table 8. The item for *"I might get dizzy while studying in my workplace"* and "*I might feel suffocated while studying in my workplace"* are at the low level (M= 2.00) (SD=0.69) and (M=1.92) (SD=0.696); meanwhile the item for *"I might suffer from burning or stinging eyes during or after study in my workplace"* and *"I might suffer from forearm pain after study in my workplace."* are at the moderate level with the mean value of (M=2.48), (M=2.56) and standard deviation of (SD=0.758) (SD=0.794). However, the items for "*I might suffer from low back pain during and after study in my workplace*" and "*I might suffer from neck pain during or after study in my workplace*" are at a high level. Most of the students might experience back pain and neck pain during study at their workplace. This is because most students agreed that the chair at their workplace is uncomfortable.

Table 8: Students' Experience in Workplace Ergonomics on Health

Student health	Mean	Standard deviation	Level
I might suffer from burning or stinging eyes during or after study at my workplace.	2.48	0.758	Moderate
I might suffer from low back pain during and after study at my workplace.	4.16	0.593	High
I might suffer from neck pain during or after study at my workplace.	4.10	0.650	High
I might suffer from forearm pain after studying in my workplace.	2.56	0.794	Moderate
I might get dizzy while studying at my workplace.	2.00	0.569	Low
I might feel suffocated while studying in my workplace.	1.92	0.696	Low

Correlation Analysis

Straightforward correlation analysis measures the link between quantitative variables. It can analyze the link between variables and the strength of the relationship. Cohen (1988) indicated that a correlation between two variables is weak if the r score is less than 0.50. In table 10, all items under the independent variable, lighting, indoor air quality, and workplace design, positively correlate with health. However, this relationship strength is considered weak because the r value is less than r=0.50. The results show that the correlation coefficient between lighting and health was (r=0.087, p=0.263), indicating that there was insignificant. It also showed an insignificant correlation between indoor air quality (r=0.018, p=0.814). However, it significantly correlated with workplace design (r=0.179, p=0.020).

H1: Lighting has a negative effect on health.

The result in table 10 did not support H1, which means lighting positively affects health (r=0.087, p=0.263). This is because the mean value obtained by the lighting variable (M=3.99)

International Journal of Innovation and Industrial Revolution
IJIREV
EISSN: 2637-0972
Volume 5 Issue 15 (December 2023) PP. 01-10
DOI 10.35631/IJIREV.515001

is high and shows that students have a good experience with lighting in their workplace. According to Mckee & Hedge (2022), ergonomic lighting is essential for the well-being of the workplace, and it plays an essential role in preventing health problems. Therefore, lighting has a positive effect on health.

H2: Indoor air quality has a negative effect on health.

Table 10 shows that the result did not support H2, meaning indoor air quality positively affects health (r=0.018, p=0.814). The result influenced by the mean obtained by the indoor air quality variable was high (M=4.22) and shows that students have a good experience and are satisfied with the indoor air quality. According to previous studies, good indoor air quality is a crucial component of a healthy indoor environment and will improve the health and well-being of students (Kurbonov & Normurodov, 2021). Therefore, indoor air quality has a positive effect on health.

H3: Workplace design has a negative effect on health.

Table 9 shows that the result supported H3, meaning workplace design has a negative effect on health (r=0.179, p=0.020). The workplace design with the mean value (M=3.70) was at a moderate level, meaning the students are not satisfied with the design because it has hurt their health. According to Jaafar, Akmal, & Libasin (2021), a good workplace design, such as a comfortable chair, can improve student posture, reduce back pain and allows proper alignment of the shoulders, hips and spine. Therefore, workplace design has a negative effect on health.

Table 9: Pearson's Correlation for Students' Experience of Workplace Ergonomics Environment and Health

	Correlation	Sig.	Result
Lighting	0.087	0.263	Not supported
Indoor air quality	0.018	0.814	Not supported
Workplace design	0.179*	0.020	Supported
Health	1	-	-

*. Correlation is significant at the 0.05 level (2-tailed).

Conclusion

This study identified the effect of workplace ergonomics environment on health. Accordingly, results show that most students had a good experience with lighting and indoor air quality in their workplaces. However, the students had a bad experience with the workplace design that impacted their health, especially back pain and neck pain. The Correlation between lighting and indoor air quality had an insignificant negative effect on health. However, workplace design had a very significant adverse effect on health. Thus, improvement for the workplace design at the library, inasis and the student lounge is necessary to further action by the university management.

For the future study, other researchers can explore factors for potential affect ergonomics risk among students. Furthermore, in terms of methodology, future research can be done using a qualitative or mix-method. The finding of this study is limited for final year students in STML, thus future study should involve larger sample including administration. To conclude, Students should be equipped with proper ergonomics practices to prevent either intangible or tangible injuries. The outcomes of this study may allow other researchers in public and private institutions of higher education to conduct a similar study to gain a more accurate knowledge of the effects of the students' workplace ergonomics environment on their health.

International Journal of Innovation and Industrial Revolution
EISSN: 2637-0972 IJIREV
Volume 5 Issue 15 (December 2023) PP. 01-10
DOI 10.35631/IJIREV.515001

Acknowledgements
The authors would like to extend sincere appreciation to the anonymous reviewer of this article for their valuable time and suggestions which significantly contributes to the improvements of this paper.

References

Afroz, S., & Haque, M. I. (2021). Ergonomics in the workplace for a better quality of work life. *In Ergonomics for Improved Productivity* (pp. 503-511). Springer, Singapore.

Cohen, J. (1988). Set correlation and contingency tables. *Applied psychological measurement*, *12*(4), 425-434.

Fernandez, J. E. (1995). Ergonomics in the workplace. *Facilities*, Vol. 13, 20-27.

Hair, J. F., Anderson, R. E., Babin, B. J., & Black, W. C. (2010). Multivariate data analysis: *A global perspective* (Vol. 7).

Jaafar, R., Akmal, A., & Libasin, Z. (2021). Ergonomics knowledge among engineering students in Pulau Pinang Malaysia. *Journal of Modern Manufacturing Systems and Technology*, 5(2), 9- 14.

Khan, R., Surti, A., Rehman, R., & Ali, U. (2012). Knowledge and practices of ergonomics in computer users. *JPMA-Journal of the Pakistan Medical Association*, 62(3), 213.

Krejcie, R. V., & Morgan, D. W. (1970). Determining sample size for research activities. *Educational and psychological measurement*, *30*(3), 607-610.

Kurbonov, R. U., & Normurodov, A. R. (2021). Role and Importance of Ergonomics in Providing Safety of Work.

Lewinski, P. (2015). Effects of classrooms' architecture on the academic performance given telic versus paratenic motivation: a review. *Frontiers in psychology*, *6*, 746.

Loo, H. S., & Richardson, S. (2012). Ergonomics issues in Malaysia. *Journal of social sciences*, 8(1), 61.

McKee, C., & Hedge, A. (2022). Ergonomic lighting considerations for the home office workplace. *Work*, (Preprint), 1-9.

Mohammad, A., Abbas, B., & Narges, H. (2019). Relationship between knowledge of ergonomics and workplace condition with musculoskeletal disorders among nurses. *International Archives of Health Sciences*, *6*(3), 121.

Mustafa, S. A., Kamaruddin, S., Othman, Z., & Mokhtar, M. (2009). The effect of ergonomics applications in work system on mental health of visual display terminal workers. *European Journal of Scientific Research*, 31(3), 341-354.

Nunnally, J. C. & Bernstein. Ih (1994). *Psychometric theory*, *3*.

Pallant, J. (2020). *SPSS survival manual: A step by step guide to data analysis using IBM SPSS*. Routledge.

Patrick Neumann, W., Steege, L. M., Jun, G. T., & Wiklund, M. (2018). Ergonomics and human factors in healthcare system design–an introduction to this special issue. *IISE Transactions on Occupational Ergonomics and Human Factors*, 6(3-4), 109-115.

Ramesh, N., Divya, J., & Anandkumar, P. (2020). Knowledge, awareness, and practices about ergonomics among dental postgraduate students–a cross sectional study. *International Journal of Scientific Study*, 8(7), 35-40.

Realyvásquez-Vargas, A., Maldonado-Macías, A. A., Arredondo-Soto, K. C., Baez-Lopez, Y., Carrillo- Gutiérrez, T., & Hernández-Escobedo, G. (2020). The impact of environmental factors on academic performance of university students taking

International Journal of Innovation and Industrial Revolution
IJIREV
EISSN: 2637-0972
Volume 5 Issue 15 (December 2023) PP. 01-10
DOI 10.35631/IJIREV.515001

online classes during the COVID-19 Pandemic in Mexico. *Sustainability*, *12*(21), 9194.

Rizkya, I., Syahputri, K., Sari, R. M., & Siregar, I. (2018, February). Evaluation of work posture and quantification of fatigue by Rapid Entire Body Assessment (REBA). In IOP Conference Series: *Materials Science and Engineering* (Vol. 309, No. 1, p. 012051). IOP Publishing.

Salleh, Fadzil, & Daud. (2020, May). Ergonomic Risk Assessment on Welding Practical Work on Learning Process at Malaysia Polytechnic Diploma of Engineering Programme. In *IOP Conference Series: Materials Science and Engineering* (Vol. 864, No. 1, p. 012102). IOP Publishing.

Sirajudeen, M. S., & Siddik, S. S. M. (2017). Knowledge of computer ergonomics among computer science engineering and information technology students in Karnataka, India. *Asian Journal of Pharmaceutical Research and Health Care*, 9(2), 64-70.

Tarcan, E., Varol, E. S., & Ates, M. (2004). A qualitative study of facilities and their environmental performance. *Management of Environmental Quality: An International Journal*.

Tholl, C., Bickmann, P., Wechsler, K., Froböse, I., & Grieben, C. (2022). Musculoskeletal disorders in video gamers–a systematic review. *BMC Musculoskeletal Disorders*, *23*(1), 1-16.

Yeow, J. A., Ng, P. K., & Lim, W. Y. (2021). Workplace ergonomics problems and solutions: Working from home. *F1000Research*, *10*(1025), 1025.

Yang, S. Y., Chen, S. C., Lee, L., & Liu, Y. S. (2021). Employee stress, job satisfaction, and job performance: A comparison between high-technology and traditional industry in Taiwan. *The Journal of Asian Finance, Economics and Business*, *8*(3), 605-618.