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Long Paper

The Effects of Learning Spaces at Home on the Students' Performance in New Normal

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Abstract

This study aimed to investigate the evident effects of learning spaces with environmental factors on the academic performance of technology *teacher-education* students during the COVID-19 pandemic. This study aimed to identify and address the influence of having learning spaces at home on the academic performance of the 86 selected 3rd-year students from the technology teacher- education in new normal. The survey questionnaire was used to gather data to 86 technology-education students via Google form. The survey link was sent together with the request letter to the respondents via email. The data were analyzed via Pearson Moment Correlation, it was proven that there was a significant relationship between the environmental factors; (lighting, noise, color, temperature and ventilation, comfortability, and flexibility) in the learning space at home towards the academic performance of the technology education students taking online programs during the pandemic. Students' comfort, concentration, conduct,

productivity, and optimism were affected by unpredictable negative consequences. Regardless, all of the respondents managed to pass the previous semester, and the majority of them belong to the honor's list despite the hindrances they have experienced. With these, the faculty should develop relevant subjects which were skill-related but did not require much concrete machinery, precisely 21st-century skills, while improvising the simulations according to the students' available resources at home.

Keywords – learning space at home, environmental factors, academic performance, online class

INTRODUCTION

Covid-19 infection was reported originally from Wuhan, China late December 2019 and quickly spread unpredictably throughout the world. On March 11, 2020, the World Health Organization proclaimed the outbreak a pandemic, as stated by Jandrić (2020). The pandemic had devastating impacts on human life and shattered economies worldwide (Xiang, S. et al., 2021). with a massive impact on the educational systems in both developed and developing countries. These impacts quickly led to the closure of schools and universities, aligned with strict government health protocols, as reported by the study of Weeden & Cornwell (2020). The usual face-to-face approach was then changed to online learning.

Online learning was commonly defined as the total opposite of face-to-face learning, as Ryan, S. et al. (2016). Its most prominent feature was the different setup of the learning environment which was the absence of the physical classroom, replaced by web-based technologies. This offers opportunities for out-of-class learning, independent of time, place, and pace, and was usually launched through Moodle and Blackboard are examples of so-called Learning Management Systems (LMS) or Virtual Learning environment (VLE) (Pellas & Kazanidis, 2015). Following the trends and reports of the previous substantial studies, the researchers seek to identify the factors that may influence, help hone, or affect the students' academic performance given this new online learning environment.

According to Bernard et al. (2014), the use of technology in blended learning courses appears to result in a minimal but considerable gain in student accomplishment – particularly when technology provides cognitive assistance (e.g., simulations) or enhances student interaction (i.e., with other students, content, and teachers). This demonstrates that students' learning requires online learning resources and an effective learning environment in which they may test and explore the knowledge they have received through hands-on activities involving simulation. The study by Vandiver (2011) distinct learning space as something that should be able to motivate learners and promote learning as an activity, as well as provide support, collaboration, and formal practice in providing a personalized and inclusive environment that was flexible enough to meet a variety of needs such as physical, virtual, social, cognitive, and biological.

To address the need to provide support, collaboration, and formal practice in personalized and inclusive environment, while meeting all the needs of the learners even in a virtual set up, the researchers seek to identify the factors that may influence or affect the students' academic performance given this new online learning environment at home. To collect data, a survey-type questionnaire was used to seek answers. All questionnaires were administered through google forms and sent via email and the letter of request to the respondents to participate in this undertaking.

Statement of the Problem

This study aimed to identify and address the evident effects of having learning spaces at home, and the disadvantages of its absence; to the "academic" performance of the 86 selected 3rd-year students from the Technology Teacher Education, in the new normal. The duration covered the second week until the third week of April 2021 and the research instrument was conducted through an online survey using Google forms.

1. What is the learning space setup of the respondents for their online classes at home in terms of
    a. Lighting
    b. Color
    c. Noise
    d. Temperature and Ventilation
    e. Comfortability and Flexibility?
2. What is the respondents' "academic" performance after their first time undergoing a semester of online classes?
3. Is there a significant relationship between learning spaces at home and students' academic performance?

Hypothesis

Null: There is no significant relationship between learning spaces at home and students' academic performance.

Alternative: There is a significant relationship between learning spaces at home and students' academic performance.

RESEARCH METHODOLOGY

Research Design

This study used a descriptive research method with quantitative data to determine how learning spaces impact technology students' academic performance in an online learning environment, as the researchers had no way to influence the dependent variables. The respondents accessed the online survey with the essential questions aligned with the study's objectives via Google forms containing the relevant question to collect the data.

Participants

Figure 2 presents a total of 109 third-year technology education college students, 40 students from Home Economics, 34 students from Industrial Arts, and 35 students from Drafting Technology.

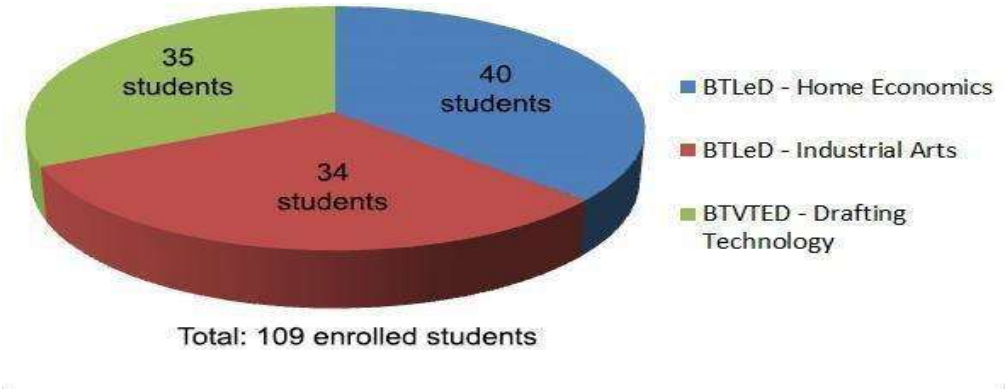

Figure 1. The population of third-year technology education college students

Procedure

The respondents were presented with a consent form containing the summative background and purpose of the research before asking their permission to take part in answering the survey questionnaire via Google forms. An estimated five minutes was needed in answering the set of questionnaires. Before administering questionnaires and other related constructs, the data collected were given with the confidentiality of personal information clause. All applicable ethical guidelines were followed throughout the conduct of the study. Procedures of the study were reviewed and approved by the committee assigned to the study.

Sampling

This research used a Simple Random Sampling in selecting the respondents as indicated in the study participants. A Simple Random Sample is a subset of a population chosen at random. Each member of the population has an exact equal probability of being chosen in this sampling approach. This approach is the simplest of all the probability sampling methods since it just takes a single random selection and little prior knowledge of the population. Any research conducted on this sample should have excellent internal and external validity due to the randomization. Simple Random Sampling was used to focus on randomly selected samples to a population of interest. The 3rd-year technology education students' population was 109, and the sample size needed was only 86 respondents. The researchers used the sample size calculator on the Raosoft website to determine the simple random sample size of the population of 3rd-year college students.

The 109 population was joined, and 86 samples were taken (following the sampling method employed in this study) from the population to complete the survey. This was calculated along with a margin of error of 5%, a confidence level of 95%, and a response distribution of 50% to get the result of 86 individuals, the final number of randomly selected respondents.

Ethical Consideration

A consent form was presented to the respondents, explaining the background and purpose of the study. No respondent was forced to provide information unless willingly given. Respondents were given assurance of complete confidentiality of personal data and were asked to consent to conduct interviews online.

Data Collection

All questionnaires were administered through Google forms and sent via email together with the letter of consent and participation request to the respondents. The researchers used standardized questionnaires. And were distributed to the 86 third-year college students, which answered a set of standardized questions and allowed them to assess its complementarity. The collected responses of the respondents were summarized on a spreadsheet and were used as the basis of the result of the study. The respondents were given a maximum of five days to answer the survey.

Measures/Instruments

This study used a survey type of question to collect data to assess how students' learning spaces at home affect their academic performance in their online classes. Google form was used as an instrument in investigating this study. The survey instrument was adapted from the recent research of Realyvásquez-Vargas et al. (2020) entitled "The Impact of Environmental Factors on Academic Performance of University Students Taking Online Classes during the COVID-19 Pandemic in Mexico". The Google form instrument consisted of two parts: Part I - focused on the demographic profile of the respondents; Part II - contained a scaled statement that determined the degree of effectiveness of the respondents' learning space in taking online classes. Part II of the survey consists of four major categories of environmental variables, each with five questions: A. Lighting, B. Color, C. Noise, D. Temperature and Ventilation, and E. Comfortability and Flexibility.

The set of questions was in order according to their category. The researchers used a 5-point modified Likert scale in this study which was: (1) Never, (2) Seldom, (3) Sometimes, (4) Often and (5) Almost Always. The respondents evaluated the questions based on their personal feelings, perceptions, and experiences. The researcher used a Google Form to create an online survey questionnaire to collect data. The letter to the respondents and the survey link was mailed to the 86 randomly selected respondents. The researcher ensured the privacy and confidentiality of the respondents.

The survey questionnaire was based on the study "The Impact of Environmental Factors on Academic Performance of University Students Taking Online Classes during the COVID-19 Pandemic in Mexico" by Realyvásquez-Vargas et al. (2020). Researchers

discovered a link between it and our study. The three categories (lighting, noise, and temperature) were modified, and temperature and ventilation, comfortability, and flexibility were added. The question in the category lighting was changed from the study "Variation of Spatial Cognition According to Visual Perception and Psychological Responses for Lighting Environments in Rest Space" by Kim, J. S., Lee, J. H., and Kim, S. Y. (2012).. Batho's (2014) study, "Noise Sensitivity and Distraction in Youth with Attention Deficit Hyperactivity Disorder write in full for the first time: The Role of Individual Difference Factors and Noise Types," inspired the noise category. The color category was adapted from Kurt and Osueke's (2014) study, "The Effects of Color on the Mood of College Students." The comfort questions were adapted from the questionnaire "Preferred Comfort Questionnaires for Product/Service Design" developed by Anjani, S. et al. (2021). Finally, the category of flexibility was adapted from Benz-Itzhak, S. et al. (2014)'s study.

RESULTS AND DISCUSSION

Social Learning Theory, propounded by Albert Bandura, developed as Social Cognitive Theory in 1986, which served as a foundation for this research, asserted that learning happens in a social setting characterized by dynamic and reciprocal interactions between the individual, the environment, and behavior. We found a variety of environmental variables, including: (1) lighting, which was crucial in visibility; (2) color, which affects the ambiance of a study area; (3) noise, which greatly hindrances concentration; (4) temperature and ventilation, which affect the mood of students; and lastly, (5) comfortability and flexibility, which were essential for safety and productivity. The factors' validity was tested to determine whether they contribute to the state of the physical and online learning environment or not.

WHAT IS THE LEARNING SPACE SETUP OF THE RESPONDENTS FOR THEIR ONLINE CLASSES AT HOME IN TERMS OF LIGHTING, COLOR, NOISE, TEMPERATURE AND VENTILATION, COMFORTABILITY, AND FLEXIBILITY?

Lighting

Table 1 presents the respondents' mean and standard deviation distribution under the category of lighting. As shown in the table above, the first exploratory statement, "The level of lighting in my study area allows me to see clearly what was around, as well as to concentrate when taking online classes." got the highest mean of 3.91 and the standard deviation of 1.00 which was often denoted as a description of slightly acceptable. This demonstrates that the illumination in the respondents' learning spaces was adequate for clear vision when taking online classes. The second exploratory statement, "I can control the level of lighting in my study area when taking online classes (for example, opening/closing blinds, curtains; having a table lamp; dimmers within reach)," obtained the lowest mean of 3.35 and standard deviation of 1.33 which was sometimes denoted as a description of neutral. This illustrates that the respondents can control the lighting in

learning environments while taking online classes. The lighting category has an overall mean of 3.60 and a standard deviation of 1.13, often with a slightly acceptable description.

Table 1. Mean and Standard Deviation distribution of the Respondent's responses on the learning space setup of the respondents for their online classes at home in terms of Lighting.

Lighting	Mean	Standard Deviation	Degree of Response	Quality of Description
1. The level of lighting in my study area allows me to see clearly what is around me and concentrate when taking online classes.	3.91	1.00	Often	Slightly Acceptable
2. I can control the level of lighting in my study area when taking online classes (for example, opening/closing blinds, curtains; having a table lamp; dimmers within reach).	3.35	1.33	Sometimes	Neutral
3. The lighting level (from the lamp's computer screen) in my study area allows me to have visual comfort when taking online classes.	3.67	1.14	Often	Slightly Acceptable
4. I am satisfied with the color temperature of the light.	3.57	1.06	Often	Slightly Acceptable
5. I am satisfied with the current light source in my study space.	3.51	1.15	Often	Slightly Acceptable
Overall Mean:	3.60	1.13	Often	Slightly Acceptable

Concerning the data provided in Table 1, Gilavand et al. (2016). stated that illumination substantially impacts learning and academic accomplishment. In reality, students cannot study unless there is appropriate lighting (Oselumese et al., 2016). Veitch et al. (2008). claim that illumination meets six human needs. (3) communication and social engagement; (4) mood state (performance); (5) aesthetic assessment; and (6) safety and health. According to Samani & Samani's (2012) study, lighting quality improves people's well-being and motivation, resulting in higher performance. As a result, resolving existing lighting issues is critical since it will boost performance satisfaction in workplaces and help

students in learning environments to perform and learn better. A good lighting quality can support human requirements; shapes influence circumstances.

Color

Table 2 presents the mean and standard deviation distribution of the respondents under the category of color. As shown in the table above, the fourth exploratory statement, "The color makes the room appear more spacious," obtained the highest mean of 3.51 and a standard deviation of 1.30, often denoted as a slightly acceptable description. This demonstrates that most respondents agree that color can make a room appear more spacious. The third exploratory statement, "The wall color was of an attractive color combination," obtained the lowest mean of 3.44 and a standard deviation of 1.27, often denoted as slightly acceptable. This indicates that some respondents have attractive colored walls in their learning areas at home. The categorical variable color has an overall mean of 3.48 and a standard deviation of 1.23, often denoted with a description of slightly acceptable.

Table 2. Mean and Standard Deviation distribution of the respondent's responses on the learning space setup of the respondents for their online classes at home in terms of Color.

Color	Mean	Standard Deviation	Degree of Response	Quality of Description
1. The color of my learning space develops my positive behavior.	3.51	1.186	Often	Slightly Acceptable
2. It allows me to maintain concentration on learning.	3.45	1.19	Often	Slightly Acceptable
3. The wall color is of an attractive color combination.	3.44	1.27	Often	Slightly Acceptable
4. The color makes the room appear more spacious.	3.51	1.30	Often	Slightly Acceptable
5. It stimulates my critical thinking.	3.50	1.21	Often	Slightly Acceptable
Overall Mean:	3.48	1.23	Often	Slightly Acceptable

Color influences behavior, cognition, performance, and intentions (Kumi et al., 2012). Color is a significant feature in the physical learning environment and one of the essential factors in interior design, according to-Samani & Samani (2012). Color can make the light seem brighter or darker. Colors have psychological connotations and affect people's moods in different ways. Plass et al. (2014). discovered that using warm colors like yellow and orange instead of cool colors like gray can help students learn. According to Warner & Myers (2009), loud colors cultivate loud ideas.

Table 3 presents the mean and standard deviation of the categorical variable noise. As shown in the table above, the fourth exploratory statement, "I find it hard to study in a noisy place," obtained the highest mean of 4.22 and a standard deviation of 1.11, almost always denoted as a description of unacceptable. This justifies that most of the respondents find it hard to study in the presence of noise. The third exploratory statement, "I can control the noise level in my study area (example: opening/closing doors/windows)," obtained the lowest mean of 2.58 and a standard deviation of 1.19, sometimes denoted as a neutral description. Only a few students claim that they can control or manipulate the noise in their respective learning spaces. The categorical variable noise has an overall mean of 3.21 and a standard deviation of 1.16, sometimes denoted as a neutral description. The results indicate some students were sensitive to noise, while in contrast, some could still concentrate despite the noise.

Table 3. Mean and Standard Deviation distribution of the respondent's responses on the learning space setup of the respondents for their online classes at home in terms of Noise.

Noise	Mean	Standard Deviation	Degree of Response	Quality of Description
1. I have privacy in my study area when I take classes online.	2.66	1.20	Sometimes	Neutral
2. My study area's noise level (from devices, people's conversations, and external sources) allows me to concentrate, take notes, and hear my teacher and classmates.	2.63	1.27	Sometimes	Neutral
3. I have control over the noise level in my study area (for example, by opening and closing doors and windows).	2.58	1.19	Sometimes	Neutral
4. I find it hard to study in a noisy place.	4.22	1.11	Almost Always	Unacceptable
5. I am sensitive to noise compared to others.	3.95	1.05	Often	Slightly Unacceptable
Overall Mean:	3.21	1.16	Sometimes	Neutral

Braat-Eggen et al. (2017) found that background noise affected 38% of students in an open-plan study environment. According to Zannin, et al. (2012)., Noise impacts academic performance in reading, writing, and comprehension. Because noise makes it difficult to focus. Students were more distracted when taking online classes from home due to increased noise levels. According to Realyvásquez-Vargas et al. (2020), a private

location may help reduce noise levels, which may help improve academic performance while taking online classes at home.

Table 4 presents the mean and standard deviation of the categorical variable temperature and ventilation. As shown in the table above, the second exploratory statement, "My study area's temperature allows me to concentrate," obtained the highest mean of 3.47 and a standard deviation of 1.09, often denoted as a slightly acceptable description. This shows most students' study areas have an adequate temperature. The fourth exploratory statement, "My room was well ventilated even without any air conditioning unit or electric fans," obtained the lowest mean of 3.01 and a standard deviation of 1.15, sometimes denoted as neutral. The categorical variables temperature and ventilation got an overall mean of 3.28 and a standard deviation of 1.09, sometimes unbiased. The results show that few students depend on natural air or don't have any electric fans and air conditioning and do not have a well-ventilated room either. This will further impact the indication that students' productivity and optimism were affected by the type of ventilation they have in their study space.

Table 4. Mean and Standard Deviation distribution of the Respondent's responses on the learning space setup of the respondents for their online classes at home in terms of Temperature and Ventilation

Temperature and Ventilation	**Mean**	**Standard Deviation**	**Degree of Response**	**Quality of Description**
1. The air quality in my study area is appropriate for taking online classes.	3.42	1.06	Often	Slightly Acceptable
2. My study area's temperature allows me to concentrate. Online classes.	3.47	1.09	Often	Slightly Acceptable
3. I can regulate the temperature in my study area (for example, by opening and closing windows and turning on and off ventilators.)	3.31	1.15	Sometimes	Neutral
4. My room is well ventilated even without any air conditioning unit or electric fans.	3.01	1.15	Sometimes	Neutral
5. I am perfectly optimistic and productive with the type of ventilation that I have in my study space.	3.19	1.02	Sometimes	Neutral
Overall Mean:	3.28	1.09	Sometimes	Neutral

Monguno et al. (2017) stated that poor infrastructure conditions such as insufficient fans and a lack of air conditioning in lecture rooms, combined with overcrowding in classrooms, may have contributed to low student performance. Thermal comfort was obtained by maintaining the temperature in response to air and moisture movement. According to the study analysis of Wargocki et al. (2019), psychological exam and school task performance can be projected to improve by 20% if classroom temperatures were dropped from 30 °C to 20 °C, and the temperature for best performance was less than 22 °C; which also applies to students who take online classes. The student will be uneasy if the temperature rises over desirable normal ranges. As a result, students' concentration and performance may deteriorate considerably.

Table 5. Mean and Standard Deviation distribution of the respondent's responses on learning space setup of the respondents for their online classes at home in terms of Comfortability and Flexibility.

Comfortability and Flexibility	Mean	Standard Deviation	Degree of Response	Quality of Description
1. I feel positive when having my online classes knowing I have a stable internet connection.	3.23	1.12	Sometimes	Neutral
2. I am satisfied with the overall ambiance of the space.	3.23	1.15	Sometimes	Neutral
3. My chair and study table are appropriately proportioned to my body to avoid slouching and injuries.	2.93	1.24	Sometimes	Neutral
4. I am free from back pain when using my study table and chair during online classes.	2.73	1.22	Sometimes	Neutral
5. The furniture I use is very ergonomic. Functional and very comfortable.	2.85	1.13	Sometimes	Neutral
6. My learning space size at home complies with at least 1.85 square meters.	3.12	1.25	Sometimes	Neutral
7. My learning space ceiling height at home complies with at least 2.5 meters.	3.50	1.18	Often	Slightly Acceptable
Overall Mean:	3.09	1.19	Sometimes	Neutral

Table 5 presents the respondents' mean and standard deviation distribution under the category of comfortability and flexibility. As shown in the table above, the seventh exploratory statement, "My learning space's ceiling height at home complies with at least 2.5 meters." obtained the highest mean of 3.50 and a standard deviation of 1.18, often denoted as a description of slightly acceptable. This clarifies that the respondents' learning areas may be small but have high ceilings. The fourth exploratory statement, "I am free from back pain when using my study table and chair during online classes," obtained the lowest mean of 2.73 and a standard deviation of 1.22, sometimes denoted as neutral. The data indicates that most respondents experience back pain when using their study tables and chairs. The categorical variables comfortability and flexibility obtained an overall mean of 3.09 and a standard deviation of 1.19, sometimes denoted as a neutral description. This means most respondents do not feel comfortable in their learning spaces which affect their mood during online classes.

According to Chandrasekar (2011), a seating specialist, when a person feels comfortable, will stay focused and motivated for longer, allowing them to absorb more information. Correct sitting can also enhance posture, increase movement, and reduce the chance of injury. To precisely emphasize the standard size of learning space, Section 707 of the Philippine National Building Code states that, the height of a room must be measured from the highest adjacent sidewalk or ground surface, but not by more than 3 meters. According to the same code, Section 806 Room Sizes, and Dimensions, a human habitation room must be 2.4495 meters long and 2.00 meters wide. A student's studying space must be at least 1.89 square meters long to be a conducive learning space.

Table 6. Overall Mean and Standard Deviation distribution of the Respondents' responses on the learning space set up for their online classes at home

	Mean	Standard Deviation	Degree of Response	Quality of Description
1. Lighting	3.60	1.13	Often	Slightly Acceptable
2. Color	3.48	1.23	Often	Slightly Acceptable
3. Noise	3.21	1.16	Sometimes	Neutral
4. Temperature and Ventilation	3.28	1.09	Sometimes	Neutral
5. Comfortability and Flexibility	3.09	1.19	Sometimes	Neutral
Overall Mean:	3.33	1.16	Often	Slightly Acceptable

Table 6 presents the overall perceptions of the respondents on the learning space set up for their online classes at home in terms of Lighting, Color, Noise, Temperature, Ventilation, Comfortability, and Flexibility. The lighting category got the highest mean of 3.60 and a standard deviation of 1.13, often denoted as a description of slightly acceptable. The color category obtained a total mean of 3.48 and a standard deviation of 1.23, often

suggested as a description of somewhat good. Meanwhile, the noise category got a real mean of 3.21 and a standard deviation of 1.16, which was sometimes denoted as a description of slightly neutral; and the temperature and ventilation category obtained a total mean of 3.28 and a standard deviation of 1.09, which was sometimes denoted as a description of neutral. Lastly, the comfortability and flexibility category obtained a mean of 3.09 and a standard deviation of 1.19, sometimes suggesting an impartial report. The overall mean of the five categories was 3.33 and a standard deviation of 1.16, often denoted as a description of slightly acceptable.

The data provided in Table 6 shows that the five environmental factors sum up the whole physical aspect of a learning space at home which significantly affected the students' academic performance in online learning during the Covid-19 pandemic. This was compatible with the two theoretical frameworks, namely Social Cognitive Theory and Humanist Theory. Gilavand (2016) claims that the learning environment influences student outcomes. The wrong temperature, inadequate lighting, overcrowded classes, misplaced boards, and incorrect classroom arrangement all contribute to issues that may confuse and distract students. It must be realized that the environmental elements at school also exist at home. While attending online classes will be a distraction and cause learners to lose concentration. It was considered that a learning environment with easily accessible and usable facilities would ensure an effective teaching and learning process and students' academic success (Usman & Madudili, 2019).

Table 7. Frequency and Percentage distribution of the Respondents' profile in terms of their Grade Point Average (GPA) of the previous semester

Grade Point Average (GPA) of the 1st semester A.Y. 2020-2021 The mean GPA of 86 respondents is **1.4017**					**Interpretation**
Range	**Grade**	**F**	**%**	**Subtotal**	
1.00 - 1.25	1.09	1	1.2	22	Excellent
	1.11	3	3.5		
	1.13	2	2.3		
	1.14	1	1.2		
	1.16	1	1.2		
	1.17	1	1.2		
	1.18	2	2.3		
	1.19	3	3.5		
	1.21	1	1.2		
	1.22	1	1.2		
	1.25	6	7.0		

Table 7. Frequency and Percentage distribution of the Respondents' profile (cont.)

Grade Point Average (GPA) of the 1st semester A.Y. 2020-2021 The mean GPA of 86 respondents is **1.4017**					**Interpretation**
Range	**Grade**	**F**	**%**	**Subtotal**	
1.50 – 1.75	1.26	1	1.2	58	Very Good
	1.27	2	2.3		
	1.28	3	3.5		
	1.29	2	2.3		
	1.30	7	8.1		
	1.30	1	1.2		
	1.32	3	3.5		
	1.32	1	1.2		
	1.33	1	1.2		
	1.33	1	1.2		
	1.34	1	1.2		
	1.34	1	1.2		
	1.34	1	1.2		
	1.36	1	1.2		
	1.37	2	2.3		
	1.38	1	1.2		
	1.38	1	1.2		
	1.39	1	1.2		
	1.39	1	1.2		
	1.42	1	1.2		
	1.43	1	1.2		
	1.43	1	1.2		
	1.43	2	2.3		
	1.44	1	1.2		
	1.45	1	1.2		
	1.46	3	3.5		
	1.46	1	1.2		
	1.47	1	1.2		
	1.50	5	5.8		
	1.52	1	1.2		
	1.57	1	1.2		
	1.59	1	1.2		
	1.60	3	3.5		
	1.63	1	1.2		
	1.67	2	2.3		
2.00-2.25	1.82	1	1.2	4	Good
	2.00	2	2.3		
	2.11	1	1.2		
2.50- 2.75	2.30	1	1.2	1	Satisfactory
3.00	2.80	1	1.2	1	Passing
	Total	86	100.0	86	

Table 7 presents the Grade Point Average (GPA) of the students after a semester (within the specified duration of the study) of online learning. The grading system interpretation was based on the Faculty Manual of MSU-IIT. Twenty-two students got a GPA of 1.00 to 1.25, which was interpreted as excellent, while 58 students got a GPA of 1.50 to 1.75, which was interpreted as very good. On the other hand, four students got a GPA of 2.00 to 2.25, which was interpreted as good, while one student got a GPA of 2.30, which was interpreted as satisfactory. Additionally, one student got a GPA of 2.80, which was interpreted as passing. The mean GPA of the 86 respondents was 1.4017.

As supporting context to the data, Rahiem, M. D. (2021). discovered that students, even with distractions, completed the semester well despite all of the problems they had the previous semester. Comprehension of various learning ideas provides a good foundation for understanding student learning patterns' adaptation to the growing emergency learning environment during health crises and their responses to the current circumstances. Motivation, which was a fundamental notion, was a complicated part of human psychology and behavior that influences how people desire to spend their time, how much energy they use on each given activity, their thoughts and feelings about the job, and the amount of time they spend on it (Urdan & Schoenfelder, 2006).

Table 8. Pearson Moment Correlation results of the significant relationship between learning spaces at home and students' performance

Variables	**N**	**Correlation**	**Sig.**	**Decision**		**Interpretation**
Age	86	-.113	0.300	Not significant	Accept null hypothesis	No relationship
Gender	86	-.192	0.077	Not significant	Accept null hypothesis	No relationship
Learning spaces at home	86	-.187	0.076	Not significant	Accept null hypothesis	No relationship

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

Table 8 displays the Pearson Moment Correlation result of the significant relationship between learning spaces at home and students' performance. The table also shows the three variables of the respondents' demographic profiles. The variable age, with a correlation of -.113 and a significance of 0.300, was found to have no significant relationship. This accepts the null hypothesis and states no relationship between learning spaces at home and the respondents' ages. The variable gender with a correlation of -.192 and a significance of 0.077 indicated no significant association. This accepts the null hypothesis and states no vital relationship between learning spaces at home and students' gender. With a correlation of -.252 and a significance of 0.019, the previous variable GPA was indicated as significant and had a fair relationship. This rejects the null hypothesis and proves a significant relationship between learning spaces at home and students' academic performance. Similarly, to the variable Learning Space with correlation value of -0.187 and

significance level of 0.076 indicates no significant effect to the academic performance of the students during the pandemic. The results indicate no significant relationship between the students' academic performance and their demographic profiles in terms of gender and age and also to the learning spaces.

Laanan's (1999) study discussed how both younger and older students had similar academic achievements as evaluated by GPA in the community college setting. This finding implies that both groups were successful and performed at the same level. There was no difference between younger and older students in terms of academic success, amount of involvement, quality of effort, overall perceptions, and academic and social adjustment. Adigun et al. (2015) determined no longer a distinction between students' cognitive, emotional, and psychomotor skill outcomes based on gender. Gilavand (2016) found that the learning environment influences student outcomes. Overcrowded classrooms, misplaced boards, and incorrect classroom arrangements all contribute to issues that may confuse and distract students in class. This happens when students take online courses at home. Realyvásquez-Vargas et al. (2020) stated that a study area design with uncontrollable environmental variables negatively affects practical human resource sustainability, in this case, the academic performance of university students.

LIMITATIONS

This study limited its investigation to the evident effects of having a comfortable and functional learning space towards the students' academic during the COVID19 pandemic while taking online classes. The correlation between the learning spaces at home and students' academic performance was determined. This study focused mainly on the 86 respondents (as determined by the sampling process) who were presently enrolled this academic year 2020- 2021 at the Department of Technology Teacher Education in the College of Education at Mindanao State University - Iligan Institute of Technology.

CONCLUSIONS

The overall results showed a significant relationship between the environmental factors; (lighting, noise, color, temperature and ventilation, comfortability, and flexibility) in learning space at home with the performance of the technology education students taking online programs during the pandemic. Further examination of the results showed that natural and artificial lighting must be balanced in the learning environment. Lighting quality was essential in assisting students in seeing clearly while doing academic work, which resulted in increased focus and learning. And in the categorical variable lighting, the only problem recorded was that students could not control the lighting level in their study areas. Meanwhile, the color in learning spaces promotes good behavior and focus, encourages critical thinking, and has a beneficial effect on students' academic progress in online classrooms. Students proved that color develops positive behavior, maintains concentration, and stimulates critical thinking. Following such, the categorical variable noise demonstrated that although some students were sensitive to noise, others could still focus in the face of noise. Despite this scenario, the respondents still managed to catch up

in their lessons. In the actual variable temperature and ventilation, some respondents claimed that they depend on natural ventilation, which was of good quality but greatly uncontrollable and was affected by the weather often. Thus the central problem of the respondents in terms of the mentioned category was the unavailability of air conditioning units and electric fans. Lastly, in the categorical variable comfortability and flexibility, most respondents said their major problems were the lack of stable internet connection and ergonomic furniture. Students' table at home was not appropriately proportioned to their bodies, which often led to back pains. Most students also claimed that their learning spaces were tight in width, but their ceilings' height at least complies with the set national standards.

The hypotheses were statistically examined to determine whether there was a significant relationship between the learning spaces at home and their academic performance, which was proven to have no significant relationship. This confirmed that students' productivity has nothing to do with their learning spaces at home. Students' comfort, concentration, conduct, productivity, and optimism were affected by unpredictable negative consequences. But all of the respondents managed to pass the previous semester. The majority of them belong to the honor's list despite the hindrances and hardships they encountered during the first semester of online classes. Still, the problems identified in this research should be proffered with solutions and/or alternatives to lessen stress among students. If these environmental conditions remain, students' motivation may suffer, and their GPAs may decline during this new learning process.

RECOMMENDATIONS

Given the findings and conclusions of the study, the following recommendations were drawn: The Department of Technology Teacher Education in the College of Education's sole department that offers training in both livelihood and technology skills. The faculty could aid in Developing relevant subjects that were skill-related but do not require much tangible machinery, specifically 21st-century skills; Conducting assessments that were highly relatable to the new normal learning setup; and Improvising the simulations according to the students' available resources at home.

The Mindanao State University-Iligan Institute of Technology is renowned for its science and technology proficiency. With this; the institution must make knowledgeable decisions and develop more interactive facilities for students which are fit for simulation; Enhance every college building's exterior and interior design to give positive ambiance further, precisely their colors; Upgrade libraries in every college building to encourage students in reading, study, and research; and develop the institute's landscapes and make them inviting enough for fun outdoor activities.

To the future researchers. The five environmental factors affect students' academic achievement during the pandemic. This might be beneficial for future research in determining the aspects that influence students' learning and assist in creating conducive learning spaces. Future researchers could improve variables and focus of the study in terms

of cognitive, attitude, and behavioral impacts on students. This might aid in developing ergonomic furniture for students who spend most of their time on academic workloads.

IMPLICATIONS

Good natural and artificial light were essential and helped improve students' productivity and learning process when performing academic work, leading to a better learning experience. The color of the wall should be bright to boost learners' motivation and behavior. Private space might help students avoid noise disturbance while studying and taking online classes. Giving students a well-ventilated and insulated room where they can take online lessons could help them improve their academic performance. Students' home furniture must be adjusted to their bodies to avoid pain in all body areas, including the back, wrists, arms, and neck. A space with at least 3.00 meters in height and 1.89 square meters in length will provide privacy, comfort, and a sense of confidence during online classes.

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