

A Study of the Influence of Learning Spaces to Secondary Students

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Abstract

Learning spaces have been observed to have influenced students' comfort and enhanced school performance. Several learning environments (school spaces) such as lesson time, comfort, arrangement of the space, emotional and physical safety, well-being, and technology use at school, and its underlying factors were determined on how it affects the learnings of secondary students, which was the focus of the study. A self-assessment tool by the OECD Learning Environments Evaluation Programme (LEEP), which generated the effective use of learning spaces in the school, supported 21st-century teaching and learning practices, and monitored the implementation of the sustainable development goal on the quality of the physical learning environment was used. Results showed that the nature of the three top school spaces; traditional classroom (59.99%), library (59.05%), and a canteen (59.04%); affecting learning were towards group work or engagements and collaborative learning with definite purpose. The learning environment that affects students' learning were psychological factors such as the choice of the workplace and movement around it, presence of a favorite subject and the chance to collaborate with other students; and the environmental factors, such as the physical appearance of the room like the color, temperature, well-equipped area and comfortable furniture. More than 75% of the students responded that the factors on the learning environment that helps them learn best were when they can see the outside's space (76.92%); and free choice of workplace area (75.00%). The least factor, although more than half, in learning spaces that affects students' learning was along the comfort of the furniture (57.69%).

Keywords: Gender difference, school climate, Learning Spaces, environment factors, psychological factors

Introduction

The Physical environment of learning spaces today plays a crucial role in shaping the behaviour and development of children which reflects the overall performance of that child. Therefore there is the need to pay necessary attention to the quality of these learning spaces to enhance comfort. Previous research observations have shown that the design of learning spaces, most especially within the classroom environment, can influence the performance of children and even their teachers, Kritchevsky and Prescott (1969). Based on these observations, Kritchevsky and Prescott show how teachers and designers can alter the environment of these learning spaces to achieve new goals or solve existing problems of comfort ability. Barret and Zhang (2009) have reported that there is a direct relationship between the physical learning environments and educational performances. Poor conditions of learning spaces can make teaching and learning more difficult. They have provided the principles for designing optimal learning spaces. (Barret & Zhang 2009.) The use of information and communication technologies (ICTs) including three dimensional (3D) virtual learning environments and digital content have provided new additional value to previous e-learning environments and learning processes. The world has changed, learning has changed and even learners have changed, while the learning space has stayed almost the same for the past hundred years. The narrowness of the definition of the learning environment, classroom- and book-orientated teaching, the central role of the teacher as well as a limited variety of teaching methods have hindered the school's

Many space design elements have effects on the environments, and these environments have direct effects on people. Well-designed environments make people happy, energize and comfortable. These elements start with building structure and shape, and complete with color, light, outside viewing and furnish. Sometimes, the influence of light in the environment is much more than other elements. Understanding the relationship between these elements and the environment can help designers or architects to improve interior designs for better performance (Oneworkpalce, 1999).

Current learning environment research has focused on the psycho-social dimensions of the environment or those studies that deal on human behavior in origin or outcome (Boy & Pine, 1988). These studies have shown that students' perception of their learning environment explained "significant amounts of variance for both students' cognitive and affective outcomes. Students are the experts when it comes to the learning environment, hence, their perceptions have been extensively and widely used in learning environment research. Most research in motivation, on the other hand, involves the identification of multiple variables that influence motivation and its effects on students' performance and related outcomes. This study aligns itself to this trend. Using OECD school user survey Improving learning spaces together, this paper will attempt to validate a questionnaire that could be applicable in the educational setting and learning environment of the Philippines' outcomes-based science secondary and measure student's perceptions of their learning environment and how the gender differences are affected by this environment.

Objectives of the study

The study identified the school climate of the high school to gender differences. Specifically, the purpose of the study includes:

1. What are the school spaces available in secondary schools?
2. What school spaces are used during and outside school time by the students?
3. What learning environment/external (outside) spaces are available for students that are directly and not-directly accessible from a classroom?
4. What Factors on Learning Environment that helped students learn best?

Materials and Methods

The participants of this study were composed of two groups: the first group are the faculty members of the College of Education. The second group of participants shall include pre-service teachers of the second semester of school year 2018-2019. Furthermore, the study will be conducted to the Grade 5 elementary students and Grade 9 secondary students located from different Municipalities of Camarines Sur.

The survey instrument was designed by the OECD Learning Environments Evaluation Programme (LEEP) as a tool for school self-assessment. It generated valuable information for school leaders, local authorities, policy makers and the wider community on the effective use of learning spaces in your school and how they can support 21st century teaching and learning practices.

The questionnaires for the secondary were lifted from the OECD School User Survey: Improving Learning Spaces Together. This unique OECD tool consists of three self-assessment questionnaires designed for students, teachers and school leaders. Survey results were used at the school level to support continuous improvement and the intelligent use or refurbishment of educational facilities.

It provides deeper insights into how physical learning environments shape teaching practices and affect students' learning outcomes and well-being. It also contributes to monitoring the imple-

mentation of the Sustainable Development Goal (4.1.a.) on the quality of the physical learning environment in schools.

The analysis of school Climate of the Secondary Schools will also be determined by Frequency, percentage, and mean.

Results and Discussion

Fraser (2012) mentioned that there were already several research conducted linking classroom environment and student outcomes in many different countries involving a huge number of participants across different school subjects. Through the years of questionnaire development and different lines of research implemented, learning environment studies have proven its significant contribution in understanding the context and construct of how learning environment influences teaching, learning, students' behavior and learning outcomes. This section presented and discussed the available and accessible learning environment (school spaces) in secondary schools which is composed of the traditional classroom, collaborative teaching area, library, auditorium, canteen, laboratory, studio, kitchen/technology space, and gymnasium. Learning space also includes an external learning environment such as a grassed area, sports field, and schoolyard. The utilization of learning spaces with consideration of its frequency of use and availability during and outside classes to students was discussed. The latter part discussed the action research that may be developed to improve school climate and gender differences in elementary schools.

1. School Spaces in Secondary Schools

The secondary schools in the province of Camarines Sur were surveyed as to the available spaces for high school students as shown in Table 1. As listed, the canteen, followed by a kitchen and library are the school spaces available in the surveyed schools, however, the auditorium, a workshop//studio space for art, music or design and the gym were the least available. Evidently, all schools surveyed have canteen as the learning space. Surprisingly, a science laboratory was below the rank (7.5) considering its importance in science classes. Students in flexible learning spaces spend a lot less time in whole-class instruction and more time working in groups.

Table 1. Spaces available in High School

Learning Environment	Frequency	Percentage	Rank
a. A Traditional classroom with no access to break out spaces	56	53.85	7.5
b. A traditional classroom with direct access to break spaces e.g. for collaborative group work, project work or individual work	71	68.27	4
c. A collaborative teaching area (2 or more teachers) with the teachers and students sharing a variety of connected learning spaces e.g. for collaborative group work, project work or individual work.	64	61.54	6
d. A space in a corridor outside the classroom	65	62.50	5
e. A library	74	71.15	2.5
f. A hall/auditorium	2	25.96	11

g. A canteen	94	90.38	1
h. A science laboratory	56	53.85	7.5
i. A workshop/studio space for art, music or design	43	41.35	10
j. A kitchen/food technology space	74	71.15	2.5
k. A gym	53	50.96	9

In flexible learning environments, students spent more time collaborating, constructively interacting with one another, and presenting their work to the class (Karrippanon et.al., 2019). The education administration might give these learning areas, like the science lab, priority for significant improvement because according to de Borja et al. (2020), the laboratory is where one may apply theory to real-world situations. A learner's holistic growth depends on the school laboratory because it requires them to complete a variety of tasks in order to comprehend difficult ideas. The inadequacy of the lab supplies and equipment, the size of the class, the length of the experiment, the accessibility of the lab space, and safety concerns prevented students from engaging in laboratory experiments and activities.

II. Learning Spaces During School Time and Outside School Time used by the students

The respondents from different secondary schools in the region were asked which learning spaces were used during and outside their lesson time for schoolwork either on their own or with other students over the last week. Table 2 and 3 showed the frequency and percentage of usage of the learning environment. In Table, the top three learning environments (school spaces) used either once a week, 2 to 4 times a week and everyday are a traditional classroom with direct access to break spaces (59.99%), library (59.05%), and a canteen (59.04%). The nature of the three top school spaces are all towards group work or engagements with definite purpose. The need for space is inherent to collaborative learning. The availability of space becomes crucial in a learning environment where group engagements are encouraged (King, 2016).

Table 2. Frequency of Use of School Spaces/ Learning environment during School Time

Learning environment	Never		Once a week		2 to 4 times a week		Everyday	
	f	%	f	%	f	%	f	%
a. A Traditional classroom with no access to break out spaces	27	25.71	20	19.05	16	15.24	25	23.81
b. A traditional classroom with direct access to break spaces	31	29.52	25	17.14	22	20.95	23	21.9
c. A collaborative teaching area (2 or more teachers) with the teachers and students sharing a variety of connected learning spaces	32	30.48	17	24.76	14	13.33	19	18.1
d. A space in a corridor outside the classroom	29	27.62	13	16.19	14	13.33	30	28.57
e. A library	32	30.48	26	12.38	16	15.24	33	31.43
f. A hall/auditorium	45	42.86	13	3.81	7	6.67	23	21.9
g. A canteen	30	28.57	11	5.71	14	13.33	42	40

h. A science laboratory	29	27.62	13	18.1	17	16.19	17	16.19
i. A workshop/studio space for art, music or design	34	32.38	18	10.48	7	6.67	14	13.33
j. A kitchen/food technology space	35	33.33	9	13.33	15	14.29	24	22.86
k. A workshop space for technology (wood, metal, plastics, robotics)	37	35.24	8	11.43	13	12.38	16	15.24
l. A gym	45	42.86	14	0.95	8	7.62	15	14.29

The gym and a hall/ auditorium, both having 45% responses were the school spaces that were never utilized. Referring to Table 1, these two school spaces also got high percentage for being not available in some of the surveyed schools.

Table 3. External Learning Environment (Outside Spaces) used outside lesson time

Learning environment	Never		Once a week		2 to 4 times a week		Everyday	
	f	%	f	%	f	%	f	%
a. A Traditional classroom with no access to break out spaces	39	37.14	20	19.05	7	6.67	20	19.05
b. A traditional classroom with direct access to break spaces	26	24.76	25	23.81	16	15.24	21	20
c. A collaborative teaching area (2 or more teachers) with the teachers and students sharing a variety of connected learning spaces	28	26.67	17	16.19	19	18.1	22	20.95
d. A space in a corridor outside the classroom	33	31.43	13	12.38	19	18.1	24	22.86
e. A library	24	22.86	26	24.76	15	14.29	25	23.81
f. A hall/auditorium	41	39.05	13	12.38	11	10.48	23	21.9
g. A canteen	31	29.52	11	10.48	13	12.38	33	31.43
h. A science laboratory	39	37.14	13	12.38	15	14.29	26	24.76
i. A workshop/studio space for art, music or design	46	43.81	18	17.14	9	8.57	18	17.14
j. A kitchen/food technology space	43	40.95	9	8.57	13	12.38	19	18.1
k. A workshop space for technology (wood, metal, plastics, robotics)	42	40	8	7.62	9	8.57	26	24.76
l. A gym	44	41.9	14	13.33	9	8.57	7	6.67

The frequency of utilization of the learning environment during school time was analyzed in Table 2. The next table (Table 3) showed the learning environment used for schoolwork by the students individually or with other students outside lesson time. The outside spaces used by the majority of the students either once a week, 2 to 4 times a week and everyday were a library (62.86%), a traditional classroom with direct access to break spaces (59.05%), A collaborative teaching area (2 or more teachers) with the teachers and students sharing a variety of connected learning spaces (55.24%). These school spaces used by the majority of the students are for collaborative group

work and project work with a space. Reinius et.al. (2021), flexible learning environments can promote cooperative learning and student agency. Collaborative learning is a direct outcome of the collaborative utilization of venues to offer chances for shared learning. However, the gym with a percentage of (41.9%) was the least used school space by the students after lesson time.

III. Learning environment/external (outside) spaces directly and not-directly accessible from a classroom

External learning environment refers to a learning environment that is not bound inside the conventional classroom which the students utilize during and off classes. The external spaces available to a majority of the schools were an external (outside) classroom or space-usually with seating and directly accessible from a classroom, grassed area (not a sports field), an external (outside) hard ball court/sports/court/hard paved area, sports field and a school yard. Majority of the schools have external learning spaces. This is vital part of the learning of the students as mentioned by Neda and Andrew (2020), pupils need to be inspired by being in outdoor, natural settings for it promotes constructive, imaginative, and collaborative play (Cooper, 2015) and constructive play happens in high-quality environments (DeBord, Hestenes, Moore, Cosco, and McGinnis, 2005). Similarly, Montessori educational philosophy agreed to this as it opposed keeping pupils in a small area all the time and outdoor spaces stimulate collaboration among students as they interact with their peers (Cooper, 2015).

Table 4 the learning environment (outside spaces) that are directly accessible from a classroom which the students utilized during lesson time. The outside space used by the majority of the students either 1 - 3 times a month, once a week, 2 - 4 times a week, and every day in the school that is directly accessible from a classroom is the sports field (78.9%), an external (outside) hard ball court/sports court (55.24%) and grassed area (not a sports field) (54.22%). School yard with a percentage of 21% was the least used external school space by the students during lesson time. The discovery of Hewitt (2015) that students recall their learning practices better when they are outside as opposed to indoors as mentioned by Afshar and Barrie (2020). it indicates that students who engaged themselves learning outside the classroom is essential to develop their understanding and have better recalling of the subjects taught in the classroom.

Table 4. Learning Environment (Outside Spaces) that are directly accessible for use by the Secondary School students

External (outside) School Space	Never or hardly ever (A)		1 to 3 times a month (B)		once a week (C)		2 to 4 times a week (D)		Every-day (E)		Sum (B-E)	
	f	%	f	%	f	%	f	%	f	%	f	%
a) Grassed area (not a sports field)	38	36.2	21	20	14	13.3	10	9.52	12	11.4	57	54.22
b) An external (outside) hard ball court/sports court	38	36.2	25	23.8	13	12.4	10	9.52	10	9.52	58	55.24
c) Sports Field	12	11.4	27	25.7	18	17.1	20	19	18	17.1	83	78.9
d) School Yard	1	0.95	0	0	22	21	0	0	0	0	22	21

Table 5 shows the learning environment (outside spaces) used by the students in the school that are not directly accessible from a classroom during lesson time. The learning environment (out-

side space) that majority of the students utilized during lesson time are the school yard (64.8%), sports field (60.92%) and grassed area (not a sports field) with a percentage of 59%. An external (outside) hard ball court/sports court is the least used external spaces with a percentage of 52.32%. As mentioned by Afshar and Barrie (2020) that according to Knap, outdoor learning opportunities help students broaden their understanding outside of the four walls of the classroom (Knapp, 1996). For instance, outdoor activities can be used to teach science subjects in physics, chemistry, biology, and even mathematics. Students who engage in these learning strategies can increase their skills (Rickinson, 2001).

Table 5. Learning Environment (Outside Spaces) that are not directly accessible from a classroom for use by the Secondary School students

External (outside) School Space	Never or hardly ever (A)		1 to 3 times a month (B)		once a week (C)		2 to 4 times a week (D)		Every-day (E)		Sum (B-E)	
	f	%	f	%	f	%	f	%	f	%	f	%
a) Grassed area (not a sports field)	35	33.3	23	21.9	12	11.4	13	12.4	14	13.3	62	59
b) An external (outside) hard ball court/sports court	40	38.1	18	17.1	18	17.1	11	10.5	8	7.62	55	52.32
c) Sports Field	32	30.5	20	19	17	16.2	10	9.52	17	16.2	64	60.92
d) School Yard	22	21	17	16.2	13	12.4	24	22.9	14	13.3	68	64.8

IV. Learning Environment (learning spaces) Factors and Students' Learning

Table 6 showed the factors in learning spaces affecting students' learning. More than 75% of the students responded that the factors on the learning environment that helps them learn best were when they can see the outside's space (76.92%); and choice of the workplace area (75.00%). The ranked 1st learning environment factor which enables students to see the learning space outside necessitates that rooms should have enough number and proper window sizes that allows the students to see the outside even when they are inside the learning space (if they were inside a learning space e.g., a library, a laboratory). The ranked 2nd, free choice of workplace area, implied that the learning space promotes individual and self-paced learning.

The least factor, although more than half, in learning spaces that affects students' learning was along the comfort of the furniture (57.69%) which is also important to the overall learning experience of the students (Riaz and Asad, 2018). All the nine learning environment factors affect student learning as evident in the result wherein it ranged from 50% to 76.92% which are categorized as psychological factors and environmental factors. The psychological factors include the choice of the workplace and move around; presence of a favorite subject and the chance to collaborate with other students which is similar to the study of Okoro (2020) that high quality learning occurs when the students relationship with other students is non-threatening, cordial and loving. Learning in such an environment is better than learning in an environment where students hate each other and do not show any consideration for collaboration with other students. The environmental factors include the physical appearance of the room like the color, temperature, well-equipped area and physical comfortable furniture as mentioned by Aboidun (2020) that the temperature of the learning space, the physical facilities (e.g. furniture) can directly affect the students focused in learning.

Table 6. Factors in learning spaces affecting students learning

Factors in the Learning Spaces	Frequency	Percentage	Rank
I can see outside's environment	80	76.92	1
I can choose where I want to work in this place	78	75.00	2
I have my favorite subject here	75	72.12	3
I have freedom to move around in this place	72	69.23	4
The color(s) are just right	70	67.31	5.5
I can easily collaborate with other students in small groups	70	67.31	5.5
The temperature is just right	69	66.35	7
It is well equipped with everything to help me learn	67	64.42	8
The furniture is comfortable	60	57.69	9

Conclusions

1. The school spaces that are available in secondary schools are the canteen, followed by a kitchen and library are the school spaces available in the surveyed schools, however, the auditorium, a workshop/studio space for art, music or design and the gym were the least available. Evidently, all schools surveyed have canteen as their most available learning space. Surprisingly, a science laboratory was below the rank considering its importance in science classes.

2. The top three learning environments (school spaces) used during lesson time either once a week, 2 to 4 times a week and everyday are a traditional classroom with direct access to break spaces, library, and a canteen. The nature of the three top school spaces are all towards group work or engagements with definite purpose. The need for space is inherent to collaborative learning. While the outside spaces used by the majority of the students outside lesson time either once a week, 2 to 4 times a week and everyday were a library, a traditional classroom with direct access to break spaces, A collaborative teaching area (2 or more teachers) with the teachers and students sharing a variety of connected learning spaces. However, the gym was the least used school space by the students after lesson time.

3. The outside space used by the majority of the students that is directly accessible from a classroom either 1 - 3 times a month, once a week, 2 - 4 times a week, and everyday in the school that is directly accessible from a classroom is the sports field (78.9%), an external (outside) hard ball court/sports court and grassed area (not a sports field). School yard was the least used external school space that is directly accessible from a classroom by the students during lesson time. The learning environment (outside space) that is not directly accessible from a classroom that majority of the students utilized during lesson time are the school yard, sports field and grassed area (not a sports field). An external (outside) hard ball court/sports court is the least used external space that is not directly accessible from a classroom.

4. All the nine learning environment factors affect student learning which are categorized as psychological factors and environmental factors. The psychological factors include the choice of the workplace and move around; presence of a favorite subject and the chance to collaborate with other students. The environmental factors include the physical appearance of the room like the color, temperature, well-equipped area and physical comfortable furniture.

More than 75% of the students responded that the factors on the learning environment that helps them learn best were when they can see the outside's space (ranked 1st); and free choice of workplace area (ranked 2nd). The least factor, although more than half, in learning spaces that affects students' learning was along the comfort of the furniture.

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