

# Caring, Learning, Adaptable and Sustainable School (Class) Building: A Mixed Use School Building

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**Abstract**— This study assessed the status of the school building in the Province of Sorsogon. Specifically, it seek answer to the following questions: 1. what is the status of school building along the identified variables (caring, learning, adaptable and sustainable) as: Learning, Evacuation and Quarantine facility? 2. What are the problems met along the identified variables (safety, adequacy, health protection, sustainability) as: Learning, Evacuation and Quarantine facility? 3. What school building design and policy intervention can be proposed based on the results of the study? Findings of the study provided baseline data needed for the assessment of the status of school building along the identified variables (caring, learning, adaptable and sustainable). There were forty (40) respondents in the Province of Sorsogon and three (3) architect's expert in their own field that reviewed and evaluated the proposed school building plan of the study. The descriptive method was used, with the self-made questionnaire as the main research instrument. The data were presented, analyzed and interpreted with the use of statistical tools such as the frequency count, ranking, percentage distribution, weighted mean and average mean. The study revealed that the following findings that the status of school building in overall weighted mean in terms of caring with 3.28; learning, 3.14; adaptability 3.31; and sustainability 3.10, were all rated as equivalent to "good" as to learning facility. As to evacuation facility an overall weighted mean of 3.01 for caring; learning 2.78; adaptability 3.18; and sustainability 2.81, all with equivalent rating of "good". As to quarantine facility, an overall weighted mean of 3.08 for caring; learning 3.06; adaptability 3.15 and sustainability 2.80, all with equivalent rating of "good". It also revealed the problems met in school buildings as learning facility in terms of safety is that there is no adequate emergency exit and fire safety equipment with a sum of rank of 88; adequacy is that the students are overcrowded using the toilet rooms (ratio of students per toilet fixtures such as water closet, lavatory and urinals not met) with a sum of rank of 97; health protection is that there is no ramp provided in every floor level with a sum of rank 97; and sustainability with a sum of rank of 105 is that it has no alternative supply of water (rain water collector). The problems met in school buildings as evacuation facility in terms of safety is that there has no adequate

emergency exits and fire safety equipment with a sum of rank of 119; adequacy is that evacuees are overcrowded in a toilet and bath rooms (ratio of evacuees per toilet fixtures such as water closet, lavatory, urinals and showers not met) with a sum of rank of 103; health protection is that it is not equipped with the minimum health standard requirements for an evacuation facility with a sum of rank 129; and sustainability with a sum of rank of 114 is that it has no alternative supply of electricity (solar panel source or standby generator). The problems met in school buildings as quarantine facility in terms of safety is that there is no separate ingress and egress for health workers and quarantined persons with a sum of rank of 152; adequacy is that that quarantined persons were overcrowded in a toilet and bath rooms (ratio of quarantined persons per toilet fixtures such as water closet, lavatory, urinals and showers not met) with a sum of rank of 114; health protection is that it is not equip with the minimum health standard requirements for a quarantine facility with a sum of rank 118; and sustainability with a sum of rank of 138 is that it has no alternative supply of water (rain water collector). Based on the findings, the following conclusions are drawn: The status of school building along caring, learning, adaptable and sustainable as to learning, evacuation and quarantine facility is "good". The problems met along the identified variables (safety, adequacy, health protection, sustainability) are: As Learning Facility: as to safety, there is no adequate emergency exit and fire safety equipment; as to adequacy, the students are overcrowded using the toilet rooms (ratio of students per toilet fixtures such as water closet, lavatory and urinals not met); as to health protection, there is no ramp provided in every floor level; and as to Sustainability, it has no alternative supply of water (rain water collector). As Evacuation Facility: as to safety, there has no adequate emergency exits and fire safety equipment; as to adequacy, that the evacuees are overcrowded in a toilet and bath rooms (ratio of evacuees per toilet fixtures such as water closet, lavatory, urinals and showers not met); as to health protection, it is not equip with the minimum health standard requirements for an evacuation facility; and as to Sustainability, some school building has no alternative supply of water (rain water collector).

As Quarantine Facility: as to safety, there is no separate ingress and egress for health workers and quarantined persons; as to adequacy, quarantined persons are overcrowded in a toilet and bath rooms (ratio of quarantined persons per toilet fixtures such as water closet, lavatory, urinals and showers not met); as to health protection, it is not equip with the minimum health standard requirements for a quarantine facility; and as to Sustainability, it has no alternative supply of water (rain water collector). The study recommended the followings: The Philippine government may construct one (1) CLASS building in each municipality of DepEd campus in the Province of Sorsogon and the four campuses of the Sorsogon State University; the DepEd and SSU may conduct assessment and evaluation of existing multi- storey school buildings for possible rehabilitation/ improvement to fit for evacuation and quarantine facility use; this study may answer the call of the President and Vice President of the Philippines for a designed building fit for evacuation and quarantine facility; this study may be the answer to the call of the education community, evacuation and quarantine users for a safe, adequate, healthy and sustainable efficient school building; this research may be a pilot study that can be replicated in other province of the Philippines and to other countries; feedback may be sent to the researcher for possible modification of the design; and further studies may be made on the following concerns: a demountable class chairs that can be stack vertically to save spaces during storage, a demountable beds that can be stack or filed to save spaces during storage and to conduct inventory of school building that may be rehabilitated/ improved to fit for learning, evacuation and quarantine facility.

**Keywords**— Evacuation facility, Learning facility, Mixed use school building, Quarantine facility.

## I. INTRODUCTION

A school is an institution designed for the teaching of students under the direction of teachers. Most countries have systems of formal education, which is commonly compulsory and may also be dedicated to one particular field (Freebase 2021). It offers knowledge to life and supports the needs of the community and the environment.

Likewise, the school building continues to transform as the needs of students and teachers evolve over the past years. Several countries have made efforts to make school buildings more than just functional buildings. They upgrade the design of these facilities with comfortable and innovative features that fit the needs of the entire campus. A relevant article published in 1843 Magazine examines these findings and discusses how

architects from across the globe are utilizing school design to foster new ways of learning (Garcia, The Importance of School Facilities in Improving Student Performance 2020).

Primarily, the school building layout and design contributes to development and experiences of the users; maybe the students, educators, community members and the invited persons that sheltered during calamities and pandemic. These experiences and feelings of the occupant should be considered for the sense of ownership, safety and health protection, privacy, socialization, spaciousness, comfort or crowdedness.

Education is a basic human right and a basis for the realization of all other rights. It is vital for development and the well-being of individuals and societies as a whole. In South Asia almost 11.3 million children at the primary level and 20.6 million children at the lower secondary level are out-of-school. South Asia is vulnerable to natural hazards, political instability, rising extremism and civil strife, which can adversely affect children's learning environment. Natural and man-made disasters increase the difficulty in delivering quality education services to children and the low levels of public finance for education limits the delivery of inclusive and equitable quality education (UNICEF 2021).

Meanwhile, as climate change intensifies, dangerous weather events, such as floods, storms/ typhoon, volcanic eruption and ash fall, earthquake, bushfires and heat waves forced millions from their homes each year. In 2018, estimated disasters displaced 17.2 million people from their home and 90 per cent fled from weather and climate-related hazards (Disasters Displace More People than Conflict and Violence 2020). A new report lists extreme weather events and major natural disasters among the top five risks in terms of possibility over the next decade based on the Global Risks Report 2020, published by the World Economic Forum (UN-Spider).

The Philippines is located along the typhoon belt in the Pacific visited by an average of 20 typhoons every year, five of which are destructive. Being situated in the "Pacific Ring of Fire" makes it vulnerable to frequent earthquakes and volcanic eruption for its geographical location and physical environment (Information on Disaster Risk Reduction of the Member Countries).

In the event of calamities in the Philippines, the nearest school site is the evacuation area using the existing

school buildings. However, the school building is not fit as evacuation center that poses more problems on the evacuees. The absence of electric power, communication, inadequate sanitary facilities, and poor food and health assistance causes more worry to the evacuees. Some vandalism caused in the school building after the evacuees left the site. Disruption of classes is evident if the school building was destroyed or evacuees cannot return to their destroyed houses and livelihood.

Meanwhile, in 1918, a strain of influenza known as Spanish flu caused a global pandemic that spreads rapidly and killed at least 50 million indiscriminately making it the deadliest pandemic in modern history. The Ebola virus which was first described in 1976 near the Ebola River in what is now the Democratic Republic of Congo has emerged periodically and infected people in several African countries (Center for Disease Control and Prevention). There have been 33 Ebola outbreaks since 1976, but the 2014 outbreak in West Africa is by far the largest (2019 WebMD).

Most likely, the coronavirus 2019 outbreak, meanwhile, is much costlier and deadlier than any of the natural disasters the world has faced, not to mention the economic impact around the world in the wake of the global pandemic. In China's response were a big quarantine facility and a harsh enforcement against for those who disobey in an authoritarian system.

Mayors in the Province of Sorsogon were asked to identify government facilities or schools that may be temporarily converted into isolation and quarantine areas for persons under watch for the coronavirus disease (COVID-19)(Manjares, Inquirer 2020). CNN Philippine News dated April 21, 2020 said that Department of Education (DepEd) approves 660 schools as quarantine areas and other pending for compliance of pertinent documents as requested by Local Government Units (LGU's). Commission on Higher Education (CHED) also issued guidelines to Local Government Units (LGUs) on how to use certain state universities and colleges (SUCs) in the areas of quarantine centers while hospitals and health centers fight from overcrowding of patients due to the pandemic.

At present, the DepEd, Schools Division Office of Sorsogon City is located at City Hall Compound, Cabid-an, Sorsogon City that supervises 83 elementary and secondary education schools. Out of 83 schools, 59 schools (71.0 %) were used as evacuation facility with an average of 6 rooms per school and with an average capacity of 20 evacuees per room. As a quarantine

facility, there were 22 (26.50 %) schools were being used from March 2020 to the present.

Similarly, the DepEd, Schools Division Office of the Province of Sorsogon is located at Balogo, Sorsogon City that supervises 531 elementary and secondary education schools. As of November 1, 2020, aftermath of "typhoon Rolly" the utilization of schools as evacuation facility having the highest number is 132 (24.85%) schools, with 573 classrooms used by 12,000 evacuees. Out of the 12,000 evacuees, 3,852 evacuees (32.10%) were considered as learner evacuees (students of their own community) and 16 evacuees (0.13%) were DepEd personnel evacuees (employees). There were 62 schools (10.82%) that were used as a quarantine facility.

Likewise, the Sorsogon State College, Sorsogon City Main Campus had 3 campuses situated at Bulan, Magallanes and Castilla. The four (4) campuses (100%) were all used as evacuation schools during calamities and three (3) campuses (75%) were used as quarantine schools during the COVID 19 pandemic.

It showed that schools were used as evacuation and quarantined facility in the City and in the Province of Sorsogon. These may be attributed for reasons of accessibility, familiarization of the school site, safeness and trust. Based on interviews and observations some evacuees were considered as school learners and school employees that used the school building as evacuation facility in their community; and some quarantined persons were considered as government employees and health workers that used the school building as quarantine facility in their locality.

President Duterte, in television report, challenges the Filipino people to build more building stronger than the wrath of typhoons and other calamities. Likewise, Vice President Leny Robredo said that while the Philippines is faced with the challenge of COVID- 19, she challenged architects to do design and build a fairer structure, more just and more humane nation (PhilGood Speeches, YouTube).

These actions of Philippine government officials prompted school buildings now to be designed to be flexible and resilient for emergency use during disasters and any pandemic. This study proposes the design of "CARING, LEARNING, ADAPTABLE and SUSTAINABLE SCHOOL (CLASS) BUILDING: A MIXED USE SCHOOL BUILDING". A school building with a triad use fit for learning, evacuation and



quarantine facility using spaces in multiple functions at one at a time and priority use.

**II METHODOLOGY**

It used the descriptive method of research to assess the status of school building fit for learning, evacuation, and quarantine facility in terms of caring, learning, adaptability and sustainability.

The same method was used to identify the problems encountered by the Provincial DRRM Head, Municipal DRRM Officers, DRRM school coordinator, DepEd DRRM officers, barangay officials, teacher and students, health workers, quarantined persons and evacuees that uses the school building during learning, evacuation and quarantine activities in terms of safety, adequacy, health Protection and sustainability.

Further, the researcher also surveyed, observed, and interviewed some DepEd personnel’s, teachers, faculty, school officials, evacuees and persons quarantined. The data were treated both through the process of descriptive style and simple statistic such as frequency count, percentage, weighted mean and ranking.

The primary sources of data of the study were the eleven (11) Municipal DRRM Officers; one (1) School DRRM Coordinator, three (3) barangay officials in- charge in infrastructure, health and evacuation; three (3) health workers; four (4) DPWH, Planning and Design Section personnel’s; three (3) quarantined persons; one (1) evacuee; one (1) student; six (6) teachers; and seven (7) faculty members. It totaled of 40 respondents. It included the three (3) specialized architects on their own field who reviewed and evaluated the proposed school building plans of the study. The study covered from January 2018 to March 2021.

Purposive sampling is intentional selection of informants based on their ability to elucidate a specific theme, concept, or phenomenon (Robinson 2014). Purposive sampling was used to select the respondents with the best knowledge and information about the study.

The knowledge data and information gathered from the seminars and trainings in the Sorsogon City Local Government- UN habitat and our school SSC and those taken from the internet, television news, magazines, newspaper and textbook/ references serve as essential sources of feedback and information.

A list of schools from DEpED Schools Division Office of Sorsogon City and the Province of Sorsogon and SSC

were collected to determine the numbers and percentage of the total schools that were used as evacuation and quarantine facility.

Likewise, a self- made questionnaire was the main research instrument as reference to gather the needed data regarding the status of the school building and problems encountered by the owners and users of the school building used as learning, evacuation and quarantine facility.

The questionnaire was divided into two parts: Part I contained the status of school building along the identified variables (caring, learning, adaptable and sustainable) as learning, evacuation and quarantine facility.

To obtain information of the status of school building with mixed uses, a five-point scale was adopted as seen below,

**Extent of Mixed Use Conditions**

Scale	Interpretation
5	Excellent
4	Very Good
3	Good
2	Satisfactory
1	Poor

Part II of the instrument was about the problems met along the identified variables (safety, adequacy, health protection, sustainability) as learning, evacuation and quarantine facility. An ordinal ranking was used to determine the highest and most problematic condition encountered by the users of the school building fitted as learning, evacuation and quarantine facility.

The data gathered were tabulated and subjected to various statistical measures like frequency count, weighted mean, ranking and percentage. Weighted mean was computed to determine the status of school building along the identified variables (caring, learning, adaptable and sustainable) used as learning, evacuation and quarantine facility.

Ranking was analyzed on the problems met along the identified variables (safety, adequacy, health protection, sustainability) used as learning, evacuation and quarantine facility. Ordinal ranking are totally ordered on the highest or biggest problem to the least problem encountered by the users of the school building. The researcher used the five-point scale on the status of school building as follows:

*Table: School Building Scale Status in Five Point Status of school building along the identified variables (caring, learning, adaptable and sustainable) used as learning, evacuation and quarantine facility.*

	Scale	Interpretation
4.5 and above	5	Excellent
3.50 – 4.49	4	Very Good
2.50 - 3.49	3	Good
1.50 – 2.49	2	Satisfactory
1.49 and below	1	Poor

**III RESULTS AND DISCUSSION**

The presentation of the data includes the following topics: 1) the status of school building along with caring, learning, adaptability, and sustainability in terms of learning, evacuation, and quarantine facility; 2) problems met in terms of safety, adequacy, health protection, and sustainability along the identified variables; 3) Proposed Caring, Learning, Adaptable and Sustainable School (CLASS) Building Design

**Status of school building along with caring, learning, adaptable and sustainable in terms of learning, evacuation, and quarantine facility;**

Table I, reveals the status of the school buildings along with caring, learning, adaptability, and sustainability in terms of learning, evacuation, and quarantine facility. Tables were used to present the data.

Status of School Building in Terms of Caring, Learning, Adaptable and Sustainable as Learning, Evacuation and Quarantine Facility

FACILITY	CARING		LEARNING		ADAPTABLE		SUSTAINABLE	
	WM	DESCRIP TION	WM	DESCRIP TION	WM	DESCRIP TION	WM	DESCRIP TION
LEARNING	3.28	Good	3.14	Good	3.31	Good	3.10	Good
EVACUATION	3.01	Good	2.78	Good	3.18	Good	2.81	Good
QUARANTINE	3.08	Good	3.06	Good	3.15	Good	2.80	Good

Good rating means “fair”, that denotes school building qualities and its usage is just acceptable for the users/ occupants since the facilities were already there and no choices to select. Fairness that they were provided with shelter and any inadequacy on needs of the users of the school building facilities used as learning, evacuation and quarantine will be just supplemented based on the capacity of the government.

Caring of the School Building as Learning Facility. Table I shows the status on the caring of the school

buildings as learning facility has an overall average weighted mean of 3.28 rated as “good”. The school buildings are present with natural light and ventilation and have electricity and good lighting. Findings showed that passive cooling and electrical utility requirements were observed in the design.

Adequate natural daylight can reduce energy demand and increase student achievements as studied by Greim (2005), US DOE-Energy Smart Schools (2021) and Mohd Najib Mohd Salleh et al (2016). It helped the school to save money in electric bills.

Every room should have sufficient number of windows and doors so that natural light comes in and should also contain facilities for artificial light. Adequate ventilation is equally important in classrooms as lighting. Sufficient number of doors and windows in classrooms will admit fresh air and light in them with free circulation. Similarly, floor ventilators blow is necessary so that fresh air can come in classrooms should have adequate number of fans in working conditions so as to make summer heat and suffocation in monsoons acceptable. Kapoor and Premi (1988) advocate at least three fans of 1200 mm diameter each and four tube lights for a classroom of size 50.37 sq.m. These fans and lights should be distributed uniformly in the working/teaching area (Verma 2021).

Learning on School Building as a Learning Facility. Table I shows the status on learning of the school buildings as learning facility obtained an overall weighted mean of 3.14 equivalent to “good”. It reflects that the school buildings are present with natural light and ventilation. It presents that passive cooling was also observed in the school building design.

Natural ventilation is considered a sustainable solution to maintain healthy and thermally comfortable internal environments. Previous studies have shown that a natural ventilation system can provide adequate fresh air and maintain thermally comfortable internal environments under specific external conditions (Angelopoulos et al. 2016).

In some DepEd and DPWH school building projects some items like ceiling and electrical works are deleted due to small funding and to far location of project resulting to double hauling cost. The absence of electrical lighting and the heat of the roof create uncomfortable condition to teachers and students. Adaptability of the School Building as Learning Facility. Table I shows the adaptability of the school

buildings as learning facility obtained an overall weighted mean of 3.31 equivalents to “good”. It reflects that the building is resilient to earthquake with the highest weighted mean of 3.48 interpreted as “good”.

Resilience to earthquake disasters should be a goal of any community living in a seismically active landscape. Resilience is the ability to not only survive but also to thrive in the face of adversity in this case an earthquake (Seville 2015).

This Fujieda et al (2008) paper particularly focused on school buildings which contributed loss of lives of many children in the past, by observing a project on "Reducing Vulnerability of School Children to Earthquakes" by UNCRD. Like other infrastructure, school buildings are subject to damage and collapse in the event of earthquakes. The recent earthquakes have exposed vulnerability of school buildings disproportionately compared to the other infrastructures. Vulnerable school buildings in seismic regions resulted in the loss of many lives of children and teachers in addition to the potential damage to the property. On the other hand, earthquake resistant schools have served as various emergency functions in the community and helped people to recover from the calamity in the aftermath of earthquakes.

The school building adaptability is good where site selection prior to construction was observed. Any actual site problems were also given attention and acted upon providing some remedial measures for building safety.

However, some natural causes like flooding and landslide may not be cause inside the school site but rather outside environment that may affect the school building soundness. Again, we remind the people to continue protect and save our natural resources for safe and healthy environment.

Sustainability of the School Building as Learning Facility. Table I shows the sustainability of the school buildings as learning facility obtained an overall weighted mean of 3.10 equivalents to “good”. The school building is provided with sanitary facilities with separate toilets for boys and girls.

The crucial role of adequate water, sanitation and hygiene (WASH) facilities in influencing children’s handwashing behaviour is widely reported. Report from UNICEF indicates a dearth of adequate data on WASH facilities in schools, especially in the developing world. It is essential to have a financial provision for water

supply in schools as this can potentially influence the existence of a hand washing station in a school. An intervention by government, educational authorities and civil society organizations towards enabling schools in low resource areas to have a sustainable budgetary allocation for WASH facilities would be timely (Appiah-Brempong et al 2018).

In other schools, the PTA shouldered the construction of a common toilet in every classroom and that requires individual septic tank. However, sometimes they forgot the requirements as per Revised Plumbing Code of the Philippines, for the construction of shallow or deep well, the minimum distance should be 15.0 meters away from any septic tank. This study provided hand washing outside the toilet rooms.

Caring of the School Building as Evacuation Facility. Table I shows the status on the caring of the school buildings as evacuation facility obtained an overall weighted mean of 3.01 equivalents to “good”. It reflects that the school building has a presence of natural light and ventilation.

As per DepEd and DPWH School building standard design requirements, consideration of the design should always be with natural ventilation and lighting, minimum of two doors per room and provision of a ramp accessible to the ground floor. These features ensure the safety and protection of the evacuees during calamities.

Nevertheless, prioritization of the sickly, aged and evacuees with disabilities to be located at the ground floor due to the absence of a ramp during evacuation activity should be considered.

A satisfactory rating was given for the provision of a kitchen and laundry. It can be noted that in some literatures and studies stated that kitchen and laundry activities in the school building should be avoided for safety and health reasons. A separate building should be provided for cooking and laundry activities to eliminate quarrel, poisoning and vandalism.

Learning on School Building as Evacuation Facility. Table I shows the status on learning of the school buildings as evacuation facility obtained an overall weighted mean of 2.78 equivalents to “good”. It reflects that the school property is safe from user’s damage and destruction.

A reinforced concrete construction of school building is easy to maintain and operate, and tough from vandalism.

Most of the school buildings being constructed now are rc concrete and steel truss roof framing. Its service is long and can be rehabilitated or retrofitted.

Adaptability of the School Building as Evacuation Facility. Table 1 shows the adaptability of the school buildings as evacuation facility obtained an overall weighted mean of 3.18 equivalents to “good”. It reflects that the school building location is safe from flooding and landslides.

Site selection analysis is a requirement for the search of school sites. The site should be away from any possible flooding and landslide threats and hazards. Inside the school site, selection of the location and position of school buildings are very important. It adds more for the resiliency and sustainability of the school building.

Sustainability of the school building as Evacuation Facility. Table I shows the sustainability of the school buildings as evacuation facility obtained an overall weighted mean of 2.81 equivalents to “good”. It reflects that there is a presence of natural light and ventilation.

Caring of the School Building as Quarantine Facility. Table 1 shows the status on the caring of the school buildings as quarantine facility obtained an overall weighted mean of 3.08 equivalents to “good”. It reflects that there is a presence of natural light and ventilation and have electricity and good lighting.

Natural ventilation is not a new technique in architecture but rather it is a traditional technique that has been neglected since the arrival of cheap energy and air conditioning. Natural ventilation lowers cooling and ventilation costs and provides a close connection with the outside environment. In addition, natural ventilation systems can help lessen noise generated by fans potentially increasing acoustic comfort (The Division of the State Architect's Sustainable Schools Resource 2007).

Aside from natural light and ventilation requirements, electrical supply is also important. Electrical lighting during rainy seasons provides additional illumination inside the classroom. Enough lighting in a room provides security and comfort to the occupants.

Learning on School Building as Quarantine Facility. Table I shows the status on learning of the school buildings as quarantine facility obtained an overall weighted mean of 3.06 equivalents to “good”. It reflects that the school buildings practice the disinfection of

school rooms, equipment and building. Any buildings used as quarantine facility should be disinfected as required by the local health authorities to maintain its safety and health condition requirements.

The purpose of this document is to provide guidance for cleaning and disinfecting in schools and child care programs. This guidance is based on the Centers for Disease Control and Prevention (CDC) recommendations for schools, workplaces, and community locations. Routine cleaning and disinfecting is key to maintaining a safe environment for faculty, students, and staff (Minnesota Department of Health 2020).

Adaptability of the School Building as Quarantine Facility. Table 1 shows the adaptability of the school buildings as quarantine facility obtained an overall weighted mean of 3.15 equivalents to “good”. It reflects that the building is resilient to typhoon.

Most of the school buildings were designed to resist 280 kph strong winds of typhoon. As per requirement of DepEd 2010 Educational Facilities Manual, the roof design of school building shall be provided with concrete gutter to lessen the effect of winds on the roof area. However, still some school buildings were constructed not following the roof design requirements.

Sustainability of the school building as Quarantine Facility. Table I shows the sustainability of the school buildings as quarantine facility obtained an overall weighted mean of 2.80 equivalents to “good”. It reflects that there is a presence of natural light and ventilation.

A study by the Heschong Mahone Group discovered that students receiving high levels of natural light where achieving test scores up to 18% higher than students receiving minimal natural light (Innova 2014). An effective classroom lighting scheme will create use of any natural light that is available and with the addition of artificial light where it is necessary. Incorporating natural light can offer physical and physiological benefits to students, teachers and administrators. Natural light is revealed to benefit the health, concentration and even test scores of pupils.

***Problems met in terms of safety, adequacy, health protection, and sustainability as learning, evacuation and quarantine facility.***

Table II, III and IV reflects the problems met in the school building as learning, evacuation and quarantine



facility in terms of safety, adequacy, health protection and sustainability. These problems were usually felt by the school authorities, learners, evacuees, health workers, quarantined persons and local governments officials while in use of the school building.

Table II: Learning Facility

Problems Met in terms of Safety, Adequacy, health Protection and Sustainability as Learning Facility.

PROBLEMS/ FACILITY	RANK OF RANK (201)	TOTAL RANK (72)
<b>LEARNING FACILITY</b>		
<b>A. Safety</b>		
a. It has no adequate emergency exits and fire safety equipment.	88	1
b. The windows are not provided with security grills and window emergency exit.	115	2
c. There is a poor effect of sunlight and natural air circulation.	187	5
d. There is no sufficient supply of water and potable water.	198	4
e. It has no electricity and poor lighting.	192	6
f. There is no ramp provided in every floor level.	131	3
<b>B. Adequacy</b>		
a. It has no adequate emergency exits and fire safety equipment.	116	2
b. There is a poor effect of sunlight and natural air circulation.	198	5
c. There is no sufficient supply of water and potable water.	197	4
d. It has no electricity and poor lighting.	213	7
e. There is no separate toilet for men and women.	202	6
f. The students are overcrowded inside the classroom (ratio of students per classroom not met).	135	3
g. The students are overcrowded using the toilet rooms (ratio of students per toilet fixtures such as water closet, lavatory and urinals not met).	97	1
<b>C. Health Protection</b>		
a. There is a poor effect of sunlight and natural air circulation.	168	5
b. There is no ramp provided in every floor level.	97	1
c. There is no sufficient supply of water and potable water.	98	2
d. It has no electricity and has a poor lighting.	195	6
e. There is no separate toilet provided for men and women.	167	4
f. There is no waste management.	115	3
<b>D. Sustainability</b>		
a. There is a poor effect of sunlight and natural air circulation.	261	9
b. It has no alternative supply of water (rain water collector).	105	1
c. It has no alternative supply of electricity (solar panel source or standay generator).	168	3
d. There is no separate toilet and bath for men and women.	250	8
e. The school property is susceptible to damage and destruction from pupils/ students.	185	4
f. The school building location is prone to flooding or landslides.	228	7
g. The building is not resilient to earthquake.	221	5
h. The building is not resilient to typhoon.	226	6
i. There is no internet connection.	152	2

**A. Problems met in terms of Safety as learning facility.**

Safety pertains to the condition of being safe from undergoing or causing hurt, injury or loss. Table II shows the problems on safety of the school building as a learning facility. It reveals that there is no adequate emergency exit and fire safety equipment rated as ranked 1 (88). During emergency, an emergency evacuation plan shall be posted in all rooms, unblocked passageway, corridors and stairways and alarm system shall be provided especially for multi-storey school building. Good condition of fire extinguisher shall also be provided. At least two exit swings out door at the opposite side is required for every room. It can be noted in the study of Lay 2001, he stated the practicalities of alternative escape solutions for today’s high rise building. The simultaneous evacuation is the ultimate emergency in terms of safety where sometimes the number and size of stairs were not properly addressed even from the start of the design phase.

Ranked 2 (115), shows that windows are not provided with security grills and window emergency exit. There some school building windows are made of glass

jalousies which are prone for vandalism and poses danger to broken glasses. Windows shall be provided with security grills with emergency exit especially when used as sleeping rooms under the Revised National Building Code and Fire code of the Philippines.

Ranked 3 (131), shows that there is no ramp provided in every floor level. All school building with one-storey and ground floor of multi-storey were provided with a ramp, however, the succeeding upper floors were not provide with access ramp. All ramps shall be designed as non- skid for safety purposes. Lay 2001 stated also that we are also faced with the need to maintain both safety and efficiency in the design of our escape system. In this study the addition of ramp design in every floor level was adapted for more safety, efficient and caring.

There is no sufficient supply of water and potable water (157), ranked 4; there is a poor effect of sunlight and natural air circulation. (198), ranked 5; there is no separate toilet for men and women (202), ranked 6; and it has no electricity and poor lighting (213), ranked 7 respectively.

**B. Problems met in terms of Adequacy as learning facility.**

Adequacy pertains to the quality or state of being adequate or sufficiency for a particular purpose. Table II shows the problems on adequacy of the school building as a learning facility. It reveals that the students are overcrowded using the toilet rooms (ratio of students per toilet fixtures such as water closet, lavatory and urinals not met) (97), ranked 1.

In construction of some school buildings, construction of toilet is sometimes optional. There are some school rooms that the PTA shouldered the construction of their children’s toilet, a common toilet for boys and girls. More spaces are occupied by the toilet extension room for every classroom added by the septic tank requirements. At present, some school building design on health, sanitary and plumbing requirements does not conform to the minimum requirements of the Revised Plumbing Code of the Philippines and the Revised National Building Code of the Philippines.

Ranked 2 (116), shows that there are no adequate emergency exits and fire safety equipment in school building as previously observed. Provisions for fire safety requirements are seldom given attention. Sometimes some of the classrooms utilized as sleeping rooms by the students during school activities, evacuees during calamities and quarantined persons during



pandemic; however, there is no provision of window fire exit and the absence of a fire extinguisher or smoke detector.

Ranked 3 (135), shows that the students are overcrowded inside the classroom (ratio of students per classroom not met). The DepEd standard classroom size is 9.0 x 7.0m with a total area of 63.0 square meters and an occupant load of 1.40 square meters per student. However due to the increasing number of student's enrollees, they sometimes exceeded the ratio of classroom to students from 1:45 to 1:55 or even 1:60. This is due to lack of classrooms and facilities.

On the other results, it shows that there is no sufficient supply of water and potable water (157), ranked 4; there is a poor effect of sunlight and natural air circulation (198), ranked 5; there is no separate toilet for men and women (202), ranked 6; and it has no electricity and poor lighting (213), ranked 7 respectively.

### ***C. Problems met in terms of Health Protection as learning facility.***

Health protection pertains to the dynamic and responsive to the current health needs of the population. Table II shows the problems on health protection of the school building as a learning facility. It reveals that there is no ramp provided in every floor level (97) ranked as no. 1. It shows that in some urban areas, multi-storey school buildings has no ramp access to every floor level. School building design and construction should be provided with mobility ramp for handicapped/disabled persons and other facilities in accordance with Batas Pambansa Bilang 344 (Accessibility Law).

In a recent study published in the journal Antiquity, researcher Debby Sneed of California State University found that the Ancient Greeks had prepared many buildings and temples with ramps to permit access to those who were disabled or had trouble climbing stairs. Built some 2,500 years ago, the ramps were used before the first wheelchair was invented making holy sites and temples more comprehensive, Sneed said that (Morris 2020). We say that learners, teachers and users of the school building welcomes to everybody.

Ranked 2 (98), shows that there is no sufficient supply of water and potable water. On health measures, sanitation adequacy is very important that considerations should include its location and condition. Adequacy of potable drinking fountains (water dispensers) and the quality of water supply should be properly observed and monitored inside the school.

Most of the students bring their own drinking water for safety reasons, but how about in rural areas where potable water is scarce? Water supply is a problem in other remote and coastal barangay school communities. Some school building designs today is supported with alternative rain water collection system to support their sanitary needs but not for drinking.

Ranked 3 (115), shows that there is no waste management. The general cleanliness of the school building, free from scattered garbage and control of pest and insects are sometimes not practiced. Teachers and learners of the school building should have a good housekeeping, garbage collection and separation of waste practices.

On the other results, it shows that there is no separate toilet provided for men and women (167), ranked 4; there is a poor effect of sunlight and natural air circulation (168), ranked 5; and it has no electricity and has a poor lighting (195), ranked 6 respectively.

### ***D. Problems met in terms of Sustainability as learning facility.***

Sustainability focuses on meeting the needs of the present without compromising the ability of future generations to meet their needs. Table II shows the problems on sustainability of the school building as a learning facility. It reveals that it has no alternative supply of water (rain water collector) (105) ranked as no. 1. It can be noted that some DPWH standard school building design has provided rain water collection in their projects constructed because of its location. This alternative water supply was for daily sanitary used and not for drinking purposes.

Ranked 2 (152), shows that there is no internet connection. Internet is a requirement in school that requires submittal of paper reports and assignments and for faculty lessons and report submissions. Students had to go to internet café or stores to rent/ use computers. Sometimes internet connection fee is again passed to PTA and additional parent's expense to buy mobile data load for their children. It can be noted that not all schools have access to internet technology.

Ranked 3 (168), shows that It has no alternative supply of electricity (solar panel source or standby generator). Local power electric cooperative supplied the everyday needs of the school's electricity, however, during emergencies were electricity is cut-off an alternative power supply is needed. Solar panel and stand-by generators requires maintenance an additional expenses.

A solar panel electric system after 3 years requires maintenance cost for effective usage. Stand-by generators requires gasoline maintenance cost for its operation. Responsibility for maintenance and operation is required.

On the other results, it shows that the school property is susceptible to damage and destruction from pupils/students (185), ranked 4; the building is not resilient to earthquake (221), ranked 5; the building is not resilient to typhoon (226), ranked 6; the school building location is prone to flooding or landslides (228), ranked 7; and there is no separate toilet and bath for men and women (250), ranked 8, respectively.

**Table III: Evacuation Facility**

Problems Met in terms of Safety, Adequacy, health Protection and Sustainability as Evacuation Facility

PROBLEMS/ FACILITY	RANK OF RANKS (1-28)	TOTAL RANKS (178)
<b>EVACUATION FACILITY</b>		
<b>A. Safety</b>		
a. It has no adequate emergency exits and fire safety equipment.	119	1
b. The windows are not provided with security grills and window emergency exit.	159	4
c. There is a poor effect of sunlight and natural air circulation.	242	8
d. There is no sufficient supply of water and potable water.	148	2
e. It has no electricity and has a poor lighting.	229	7
f. There is no pet animal allowed.	228	6
g. There is no kitchen provided for food preparation and cooking.	161	5
h. There is no ramp provided in every floor level.	154	3
<b>B. Adequacy</b>		
a. It has no adequate emergency exits and fire safety equipment.	143	3
b. There is a poor effect of sunlight and natural air circulation.	218	6
c. There is no sufficient supply of water and potable water.	148	4
d. It has no electricity and has a poor lighting.	225	7
e. There is no separate toilet and bath for men and women.	188	5
f. The evacuees are overcrowded in a room (ratio of family evacuees per room not met).	105	2
g. The evacuees are overcrowded in a toilet and bath rooms (ratio of evacuees per toilet fixtures such as water closet, lavatory, urinals and showers not met).	103	1
<b>C. Health Protection</b>		
a. There is a poor effect of sunlight and natural air circulation.	238	8
b. There is no ramp provided in every floor level.	158	5
c. There is no sufficient supply of water and potable water.	138	2
d. It has no electricity and has a poor lighting.	237	6.5
e. It is not equip with the minimum health standard requirements for an evacuation facility.	129	1
f. There is no laundry area provided.	157	4
g. There is no separate toilet and bath provided for men and women.	237	6.5
h. There is no waste management.	147	3
<b>D. Sustainability</b>		
a. There is a poor effect of sunlight and natural air circulation.	258	9
b. It has no alternative supply of water (rain water collector).	114	1
c. It has no alternative supply of electricity (solar panel source or standby generator).	189	3
d. There is no separate toilet and bath provided for men and women.	199	5
e. The school building location is prone to flooding or landslides.	190	4

**A. Problems met in terms of Safety as Evacuation Facility.**

Table III shows the problems on safety of the school building as evacuation facility. It reveals that there has no adequate emergency exits and fire safety equipment (119), ranked as no. 1. School building with one storey height has no problem on fire or emergency exits. However, some multi-storey school buildings have only one stair provided access to second floor. Others were designed with a main stair and additional steel framing stairs at the opposite side with no cover roof. It is unsafe to use the stairs during rainy seasons for it is slippery. During fire and very hot sunny days, stair metal or steel guardrails are hot because they are heat conductors.

Ranked 2 (152), shows that there is no sufficient supply of water and potable water. Evacuees usually bring their own mineral water for drinking. However, LGU’s DRRM officers or in-charge should provide additional potable water supply for uncontrolled scenario where supply of local water utility companies cut their services because of electric power supply failure.

Ranked 3 (154), shows that there is no ramp provided in every floor level. School building design and construction should be provided with mobility ramp for handicapped/ disabled persons and other facilities in accordance with Batas Pambansa Bilang 344 (Accessibility Law). Some evacuee’s health conditions should be considered especially for PWD’s, sickly, and bedridden and others with health problems on a wheelchair, crutches or on support system. Others evacuees prefer on higher level rooms because they want more fresh air and ventilation.

On the other results, it shows that the windows are not provided with security grills and window emergency exit (159), ranked 4; there is no kitchen provided for food preparation and cooking (161), ranked 5; there is no pet animal allowed (226), ranked 6; it has no electricity and has a poor lighting (229) ranked 7; and there is a poor effect of sunlight and natural air circulation (242), ranked 8 respectively.

**B. Problems met in terms of Adequacy as Evacuation Facility.**

Table III shows the problems on adequacy of the school building as evacuation facility. It reveals that evacuees are overcrowded in a toilet and bath rooms (ratio of evacuees per toilet fixtures such as water closet, lavatory, urinals and showers not met) (103), ranked no. 1. Even standard school building design and construction have adequate design for toilet requirements. Ordinary learning activities with the highest number of learner users, the toilet fixtures are inadequate. During calamities where the evacuees are the users they have no place to take a bath. Well, for the reason that school building is not designed for evacuation facility, but are being use as temporary evacuation facility.

Ranked 2 (105), it shows that the evacuees are overcrowded in a room (ratio of family evacuees per room not met). This scenario happens when late evacuees try to occupy the occupied rooms and evacuation planning and management officers are overpowered by the surge of new evacuees. Other evacuees are the ones that choose their rooms for

security and comfort reasons. It is very important that school and LGU's DRRMO coordinators are well trained to handle this situation to avoid overcrowding.

Ranked 3 (143), it shows that it has no adequate emergency exits and fire safety equipment. Emergency fire exit window is mandatory in every room utilizes as sleeping rooms under the Revised Fire Code of the Philippines. These requirements are aside from the required fire exit stairs. Evacuees will be using the school building as temporary sleeping shelter during calamities and other hazard conditions. Also emergency fire extinguisher is required to be present in a school building.

On the other results, it shows that there is no sufficient supply of water and potable water (145), ranked 4; there is no separate toilet and bath for men and women (188), ranked 5; there is a poor effect of sunlight and natural air circulation. (218), ranked 6; and there is no sufficient supply of water and potable water (225), ranked 7 respectively.

#### ***C. Problems met in terms of Health Protection as Evacuation Facility.***

Table III shows the problems in health protection of school building as evacuation facility. It reveals that it is not equip with the minimum health standard requirements for an evacuation facility (129) ranked as no.1. Some evacuees are mother to their newly born babies that they need lactation room where they can breastfeed their babies. Cooking is not allowed in the school building as presented in many literatures and studies to prevent fire and food poisoning. It is the responsibility of the school DRRMO coordinator to ensure its health and safety environment. Radio or control room for monitoring and health security is very important to ensure constant communications inside and outside the evacuation facility.

Ranked 2 (105), it shows there is no sufficient supply of water and potable water. It is very important that a shallow or deep well is present in the school or a rainwater collector as an alternative source. Maintenance of toilet facilities and the cleaning of the school need water after the calamities. Potable water should be sourced from any water refilling station for health and safety reasons.

Ranked 3 (147), show that there is no waste management in the school. School building should be maintained to its original condition during and after the evacuees left. Scattered garbage, plastic mineral water waste,

destroyed chalkboards and writing on walls are just example of garbage waste and vandalism which should be avoided during evacuation activity.

On the other results, it shows there is no laundry area provided (157, ranked 4; there is no ramp provided in every floor level (158). Ranked 5; it has no electricity and has a poor lighting and there is no separate toilet and bath provided for men and women (237), both ranked 6.50; and there is a poor effect of sunlight and natural air circulation (238), ranked 8 respectively.

#### ***D. Problems met in terms of Sustainability as Evacuation Facility.***

Table III shows the problems on sustainability of school building as evacuation facility. It reveals that some school building has no alternative supply of water (rain water collector) (114), ranked no. 1. In urban areas where local water utility company serves the needs of water supply of the school, they usually do not push to have an alternative water collector because of maintenance. However, during calamities and natural disaster we cannot rely on an uninterrupted supply of water. At present, rain water collector is part of the construction of school building in remote and coastal school areas.

Ranked 2 (172), it shows there is no internet connection. Access on internet connection lies on the local internet companies. During bad weather connection and other natural disasters, internet access suffers damages and interruption of its services is cut. Even the school has internet access if the internet company signal fails, it becomes an ineffective.

Ranked 3 (189), it shows that it has no alternative supply of electricity (solar panel source or standby generator). Most of the schools today are on upgrading to have an alternative electric supply like solar panel installation or standby generator just for lighting to ensure safety and protection. They usually installed it on the roof assembly which is prone for destruction during bad weather. Caution on the proper location and installation of the said equipment for effective usage and less maintenance.

On the other results, it shows that the school property is susceptible to damage and destruction from evacuees (190), ranked 4; there is no separate toilet and bath provided for men and women (199), ranked 5; the school building location is prone to flooding or landslides (208), ranked 6; the building is not resilient to



earthquake (230), ranked 7; and the building is not resilient to typhoon (245) ranked 8 respectively.

**Table IV: Quarantine Facility Problems Met in terms of Safety, Adequacy, health Protection and Sustainability as Quarantine Facility**

PROBLEMS/ FACILITY	RANK OF RANK (1st)	TOTAL RANK (2nd)
<b>QUARANTINE FACILITY</b>		
<b>A. Safety</b>		
a. It has no adequate emergency exits and fire safety equipment.	182	4
b. There is no separate ingress and egress for health workers and quarantined persons.	152	1
c. There is no separate disinfection room for health workers and quarantined persons.	169	3
d. There is a poor effect of sunlight and natural air circulation.	286	9
e. There is no ramp provided in every floor level.	215	7
f. The healthcare workers are not provided with sleeping quarters/ room.	203	5
g. The windows are not provided with security grills and window emergency exit.	229	8
h. The cooking of food is not allowed.	209	6
i. There is an insufficient supply of potable water.	155	2
<b>B. Adequacy</b>		
a. It has no adequate emergency exits and fire safety equipment.	151	4
b. There is a poor effect of sunlight and natural air circulation.	200	6
c. There is no sufficient supply of water and potable water.	145	3
d. It has no electricity and has a poor lighting.	277	7
e. There is no separate toilet and bath for men and women.	184	5
f. The quarantined persons are overcrowded in a room (ratio of quarantined persons per room not met).	119	2
g. The quarantined persons are overcrowded in a toilet and bath rooms (ratio of quarantined persons per toilet fixtures such as water closet, lavatory, urinals and showers not met).	114	1
<b>C. Health Protection</b>		
a. There is a poor effect of sunlight and natural air circulation.	225	7
b. There is no sufficient supply of water.	165	4
c. It has no electricity and has poor lighting.	246	8
d. There is no separate toilet and bath provided for men and women.	192	5
e. It is not equip with the minimum health standard requirements for a quarantine facility.	118	1
f. The healthcare workers are not provided with sleeping quarters/ room.	153	3
g. There is no sufficient supply of potable water.	139	2
h. There is no ramp provided in every floor level.	200	6
<b>D. Sustainability</b>		
a. There is a poor effect of sunlight and natural air circulation.	272	9
b. It has no alternative supply of water (rain water collector).	138	1
c. It has no alternative supply of electricity (solar panel source or standby generator).	183	4
d. There is no separate toilet and bath provided for men and women.	196	5
e. The school property is susceptible to damage and destruction from quarantined patients.	142	2
f. The school building location is prone to flooding or landslides.	205	6
g. The building is not resilient to earthquake.	240	7
h. The building is not resilient to typhoon.	250	8
i. There is no internet connection.	171	3

**A. Problems met in terms of Safety as Quarantine Facility.**

Table IV shows the problems on safety of the school building as quarantine facility. It reveals that there is no separate ingress and egress for health workers and quarantined persons (152), ranked no. 1. These will also ensure the proper monitoring and observation of quarantine persons and health workers the same. Proper logbook and information data gathering is secured for protection and control of same. Transfer of infectious disease is lessen and avoided with these scheme of crowd control.

Ranked 2 (155), it shows that there is an insufficient supply of potable water. Potable water should be accessible to health workers and quarantined persons to ensure health and safety drinking water. The LGU’s is now responsible for the full operation and maintenance of the quarantined facility. All needs of the operation of the quarantined facility from water supply, electric power supply and food as well. The SUC’s and DepEd, owner of the school building shall only provide and relinquish the school building for the use of LGU’s as quarantine facility. Proper disinfection and repair of

damage properties of the school building shall be done by the LGU’s prior to turn-over again to the school authorities

Ranked 3 (169), it shows that There is no separate disinfection room for health workers and quarantined persons. It is very important that any person entering and going out in the school building as quarantine facility should be disinfected for health and safety reasons. Care and protection is the best way to control and illuminate transfer of infectious disease.

On the other results, it shows that it has no adequate emergency exits and fire safety equipment (182), ranked 4; the healthcare workers are not provided with sleeping quarters/ room (203), ranked 5; the cooking of food is not allowed (209), ranked 6; there is no ramp provided in every floor level (215), ranked 7; the windows are not provided with security grills and window emergency exit (229), ranked 8; and there is a poor effect of sunlight and natural air circulation. (286), ranked 9 respectively.

**B. Problems met in terms of Adequacy as Quarantine Facility.**

Table IV shows the problems on adequacy of the school building as quarantine facility. It reveals that quarantined persons are overcrowded in a toilet and bath rooms (ratio of quarantined persons per toilet fixtures such as water closet, lavatory, urinals and showers not met) (114), ranked as no. 1. School building standard design shows inadequate number of toilet fixtures and the absence of a bath cubicle. The unexpected use of school building as quarantine facility this COVID- 19 pandemic is not envisioned by school building designers and planners.

Ranked 2 (119), it shows that the quarantined persons are overcrowded in a room (ratio of quarantined persons per room not met). This situation happens when the spread of infectious diseases in not controlled and monitored. As the number of travellers grow and uncontrolled, the spread of the pandemic will continue so as the number of quarantined persons. Planning, management and control of school building as quarantine facility is very important. Ensure that the number of quarantined persons is only allowed to its designed capacity.

Ranked 3 (145), it shows that there is no sufficient supply of water and potable water. The LGU’s must be vigilant to ensure the sufficient supply of sanitary water and potable drinking water. Hygienic water supply creates a clean, safe and healthy environment needed in

a quarantine facility. Water therapy drinking contributes much on as sick persons for normal recovery.

On the other results, it shows that It has no adequate emergency exits and fire safety equipment (151), ranked 4; there is no separate toilet and bath for men and women (184), ranked 5 ; There is a poor effect of sunlight and natural air circulation. (200), ranked 6; and it has no electricity and has a poor lighting (277), ranked 7 respectively.

**C. Problems met in terms of Health Protection as Quarantine Facility.**

Table IV shows the problems on health protection of the school building as quarantine facility. It reveals that it is not equip with the minimum health standard requirements for a quarantine facility (118), ranked no. 1. Medical rooms and basic medical equipment is necessary for its operation. Electronic paging, monitoring and information system lessen direct contact of quarantined persons and health workers.

Ranked 2 (139), it shows that there is no sufficient supply of potable water. The LGU’s should provide drinking water dispenser to avoid plastic waste from plastic bottled drinks. It also creates continues supply of potable water.

Ranked 3 (153), it shows that the healthcare workers are not provided with sleeping quarters/ room. Sleeping quarters for medical workers is very important to avoid daily movement of going home and answer the needs of displaced workers due to discrimination. It ensures 24 hours on-duty shift of medical assistance in the quarantine facility.

On the other results, it shows that there is no sufficient supply of water (165), ranked 4; there is no separate toilet and bath provided for men and women (192), ranked 5; there is no ramp provided in every floor level (200), ranked 6; There is a poor effect of sunlight and natural air circulation. (225), ranked 7; and It has no electricity and has poor lighting (246), ranked 8 respectively.

**D. Problems met in terms of Sustainability as Quarantine Facility.**

Table IV shows the problem on sustainability of the school building as quarantine facility. It reveals that it has no alternative supply of water (rain water collector) (138), ranked as no. 1. Rain water collection is necessary for continues operation of sanitary toilets even without the supply the local water utilities. Safe storage of

refilled big plastic potable water containers be done for medical use is also needed. Ranked 2 (142), it shows that the school property is susceptible to damage and destruction from quarantined patients. Electronic monitoring camera should be provided along corridors and outside of school building for proper monitoring and control but not inside the quarantine and toilet rooms for privacy reasons. All damages repair will be shouldered by the LGU’s.

Ranked 3 (171), it shows that there is no internet connection. It helps the health workers and quarantined person continues contact communication to their loved ones, families and friends. It will give more confidence and strength to patients to fight the pandemic.

On the other results, it shows it has no alternative supply of electricity (solar panel source or standby generator) (183), ranked 4; There is no separate toilet and bath provided for men and women (196), ranked 5; the school building location is prone to flooding or landslides (205), ranked 6; the building is not resilient to earthquake (240), ranked 7; the building is not resilient to typhoon (250), ranked 8; and there is a poor natural light and ventilation (272), ranked 9 respectively.

**PROPOSED DESIGN OF THE CARING, LEARNING, ADAPTABLE AND SUSTAINABLE (CLASS) BUILDING: A MIXED USE SCHOOL BUILDING**

The Philippine recent education reforms sought to boost enrolment levels, graduation rates and mean years of schooling in elementary and secondary education, and to improve the quality of higher education. In 2017, the National Economic and Development Authority (NEDA) of the Philippines published the “Philippine Development Plan 2017- 2022”, envisioning the Philippines to become upper middle income country by 2022 that will reduce inequalities and poverty (Macha et al, Education System profile).

The Philippine government initiated administrative changes in the basic education system and significantly increased education expenditures. In higher education, the government pursues to expand access and participation and more importantly it tries to improve the quality of education.

The Department of Education (DepEd) issues this DepEd Order No. 64, s 2017 on Establishing the Minimum Performance Standards and Specifications (MPSS) for DepEd School Buildings to guide the Department and other stakeholders in the preparation of plans such as architectural, structural, electrical, fire

protection and sanitary. It ensures the comfort and safety of the would-be occupants of the school buildings (Llego).

The school building design faces the needs for comfort, safety, and security of occupants at all times as learning and an evacuation facility. We face to the truth that our country is vulnerable to disasters. According to study made by Germanwatch (2020) the Philippines is fourth most affected by disasters. And the potential future effects of global climate change include more frequent wildfires, longer periods of drought in some regions and an increase in the number, duration and intensity of tropical storms (NASA, Global Climate Change).

The Philippine government mounted a multi-zone response to the COVID-19, through the Interagency Task Force (IATF) on Emerging Infectious Diseases chaired by the Department of Health (DOH), aiming to contain the spread of COVID-19 and mitigate its socioeconomic impacts. It implemented various actions including community quarantine in Metro Manila which expanded to Luzon as well as other parts of the country and adapting the use of school building as quarantine facility.

The continuation of the school quarantine will have substantial social and economic impact, an effort to control transmission of infections. The school building as quarantine facility will help ensure timely and adequate treatment to save lives, contributing as one of the primary public health measure.

The school building is the simplest traditional shelter of Philippine community from human and natural disasters and a health clinical care unit. An effective communication center, soliciting feedback and information to understand community needs.

#### **GENERAL OBJECTIVE**

To design a school building with a triad use fit for learning, evacuation and quarantine facility.

#### **SPECIFIC OBJECTIVES**

1. To design the Caring, Learning, Adaptable and Sustainable School (CLASS) Building: A Mixed Use School Building.
2. To be a pilot study on how to design a school building that can be fitted as learning, evacuation and quarantine facility at one at a time and priority use.
3. To answer the needed design of the education facilities for temporary use of the school building as evacuation and quarantine facility.

4. To enhance public awareness of the proper use of school building as temporary evacuation and quarantine facility.

### **THE PROPOSED DESIGN OF THE CARING, LEARNING, ADAPTABLE AND SUSTAINABLE (CLASS) BUILDING: A MIXED USE SCHOOL BUILDING**

The Philippines will continue to face the challenge of the educational facilities like the school building to answer of the community needs not only in education but also the present and the future needs. This study tries to solve other extension of learning thru redesigning school building into a multi-use space.

#### **A. DESIGN THEORY**

“We can use school building spaces in multiple functions at one at a time and priority use”

#### **B. DESIGN CONSIDERATIONS**

This study uses the following design considerations:

*The school building is designed with a triad function fit for learning, evacuation and quarantine facility with a one at a time and priority use.*

Prioritization, it says that “everything is important” stated by Mackay 2020, but we can prioritize are work and time, he added. If we want higher expectation, we decide the things that deserve the greater attention. In this study the role of the school building in the local communities is great but cannot serve at the same time. One activity should be prioritized to function while others to wait for the meantime.

The learning space can be flexible in use and can be fitted to other uses as sleeping area, evacuation area and a quarantine area with added features. The school building is a unique space with a significant function and role to the community. The approach to use the school building spaces can be arranged in priority manner based on their importance (prioritization) and dire needs to address a certain problem. Working in an important single activity at a time releases stress and focus to improve productivity and time management. We have to select the best and appropriate use of the school building as prescribed by the situation whether in learning, evacuation and quarantine activity.

*Orientation of the school building for maximum natural light and ventilation.*

Tropical region known with warm and humid climate condition lies within the Tropics of Cancer and



Capricorn between latitude of 15°south and 15°north covering the regions of Malaysia, Singapore, Indonesia, Philippines, India and northern Australia, part of Africa and Latin America. In the tropical region, climatic factor notably affects the microclimate and indoor thermal comfort in a building. (Jamaludin et al 2014).

In this study, it recommends that the CLASS building where the longer side faces the north and south direction to compensate the maximum prevailing cool wind coming from northeast (amihan)and southwest (habagat) direction. It also minimizes the direct sunlight inside the rooms. The ceiling fan and stand fan is suggested to have a cooler area in the middle, hot air stay up near the ceiling. An electric fan makes other parts of the building cool and pushed heat outside but features a climate sensitive building, an artificial passive cooling system with a little expense.

Pathirana et al 2019 conducted study on the effect of building shape, zones, orientation and window to wall ratio (WWR) on the lighting energy requirement and the thermal comfort in the naturally ventilated houses in tropical climate. The results indicate that the rectangular shape with staircase positioned in the middle of the house will provide higher thermal comfort for WWR of 20 and for other WWRs the L-shaped models provide higher thermal comfort when the staircase is positioned at the short corner or middle.

In this study, the building is designed in a rectangular form with one main stair near the center, with the additional stairs on both sides and a ramp on the front. Natural ventilation, indoor air quality, energy cost conservation and natural lighting is properly observed.

***Accessibility in the school building with provision of ramp in every floor level.***

“The Buildings for Everyone guide” is particularly important for those who own, design, build and manage public facilities. It describes the building user experience for people with a wide range of physical, sensory and cognitive capabilities and shows real-world approaches to the design, construction and management of public buildings to meet their needs (Salesa et al, 2019).

Access to any public buildings is human right that encourages building owners and designers to consider the needs of all users of free access. In this study, provision of a ramp to access the different floor level was observed. The main stair was provided with a rise

(height) of 150mm and a run (step) of 300mm for a safe and convenient stairway.

In addition, a window fire escape ladder is provided in the classroom and sleeping rooms for easy emergency exit in case the fire in near the door. It is a basic requirement in the Revised Fire Code of the Philippines that any room used as sleeping room should have an additional door or window fire escape aside from the existing door.

***Revised Philippine National Building Codes and its other referral codes.***

Presidential Decree 1096, popularly known as the National Building Code of the Philippines, which was issued on February 19, 1977 has achieved the purpose of enforcing uniform standards and requirements on building design, construction, use, occupancy and maintenance in line with the policy of the state to safeguard life, health, property and public welfare (NBC IRR). The Philippine National Building Code was considered in the design of the CLASS Building together with its referral codes of the different professional regulatory laws in the Philippines pertaining to design and construction of buildings.

***Alternative electrical power source (solar panel) and rain water collector system.***

Renewal Energy is sustainable for its source is inexhaustible like the solar panel. It is a clean energy and non-pollutant. It does not emit any greenhouse gases or toxic waste in the process of producing electricity. It is a sustainable energy source which be relied on for the long-term (De los Santos 2016).

In this study, a solar panel garden at the roof deck was designed to supply the needs of electric power supply for 24 hours. It supports the government’s goal of energy self-sufficiency and sustainability, climate Change challenges and addresses environmental concerns.

Likewise, the Philippines is a tropical country with rain falling almost half of the year, however, in other places in the country still experiences water shortage during summer. This is where collecting and managing rainwater can be valuable. Collecting rain and storing it will ensure that there is water stored for summer use. Rainwater harvesting is environmentally friendly as harvested rainwater may be used for watering plants, flushing, and process water with additional treatment may be utilize as drinking water as well (Water Care 2021). Rainwater Harvesting is the practice of collecting

rainwater run-off from a roof provided with water fine filter and then storing it for use. In this study, a rain water collector tanks is provided with filter to address user’s water saving needs. The water tank filter reduces tank maintenance by diverting water from the roof surface, which is usually contaminated with dust and dirt.

**Additional features**

- a) Uses -9 watts led bulb lights that is environment friendly, withstand shocks and vibration, lights up instantly, no uv emissions an equivalent 16 watts’ compact lights illumination.
- b) Storage area
- c) Lactation Room
- d) Solar light post at the roof deck

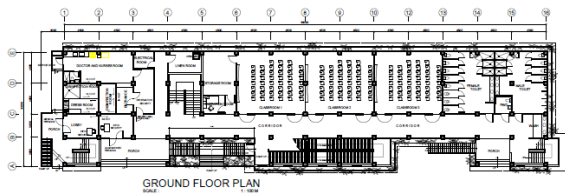


Figure I, Ground Floor Plan

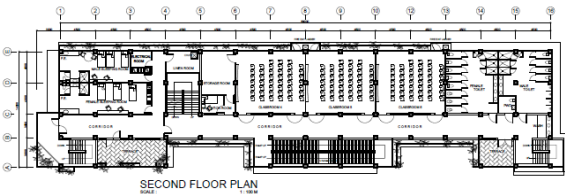


Figure II, Second Floor Plan

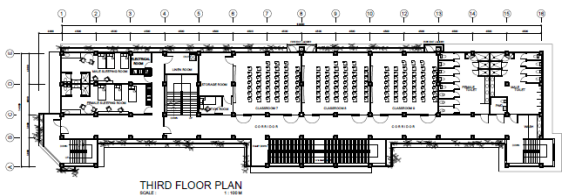


Figure III, Third Floor Plan

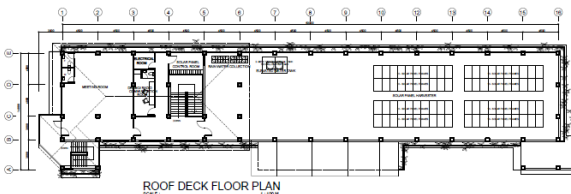


Figure IV, Roof Deck Floor Plan



Figure V. Aerial Perspective

**IV CONCLUSION**

The following are the conclusions:

The status of school building along caring, learning, adaptable and sustainable as to learning, evacuation and quarantine facility is good.

The problems met along the identified variables (safety, adequacy, health protection, sustainability) are:

As Learning Facility: as to safety, there is no adequate emergency exit and fire safety equipment; as to adequacy, the students are overcrowded using the toilet rooms (ratio of students per toilet fixtures such as water closet, lavatory and urinals not met); as to health protection- there is no ramp provided in every floor level; and as to Sustainability, it has no alternative supply of water (rain water collector).

As Evacuation Facility: as to safety, there has no adequate emergency exits and fire safety equipment; as to adequacy- that the evacuees are overcrowded in a toilet and bath rooms (ratio of evacuees per toilet fixtures such as water closet, lavatory, urinals and showers not met); as to health protection, it is not equip with the minimum health standard requirements for an evacuation facility; and as to Sustainability, some school building has no alternative supply of water (rain water collector).

As Quarantine Facility: as to safety, there is no separate ingress and egress for health workers and quarantined persons; as to adequacy, quarantined persons are overcrowded in a toilet and bath rooms (ratio of quarantined persons per toilet fixtures such as water closet, lavatory, urinals and showers not met); as to health protection, it is not equip with the minimum health standard requirements for a quarantine facility; and as to Sustainability- it has no alternative supply of water (rain water collector).

The “Caring, Learning, Adaptable, Sustainable School” (CLASS) Building is proposed.

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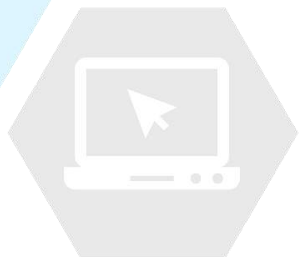
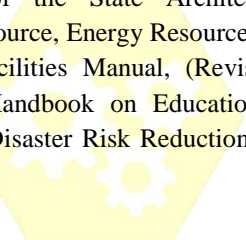
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