Bhutanese school building and classroom: its realities and challenges

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Abstract: The exploratory with the qualitative study was carried out in public schools under Thimphu Thromde to examine the physical infrastructure such as school buildings and classrooms. Through lucky dip, two higher secondary schools, one middle secondary school, lower secondary and primary school were selected for the study. The data collected through school and classroom observations were analysed using the content or thematic analysis. The findings and discussion revealed that classrooms were overcrowded. There was no emergency exit door in any classrooms in an event of a disaster. The winter heat insulation was missing in all schools. Classrooms have a simple green board with less provision of ICT. To ensure quality teaching-learning the study recommends the Ministry of Education (MoE) to review the present school construction design and guidelines by incorporating temperature insulation building to have effective teaching-learning thought out the year. Create smart classrooms with ICT, overhead projector, white screen and computer screens along with the green board. In the era of science-based technology, classrooms need to be equipped with technology-based teaching-learning. Staffrooms need to be in cubicles with the subject department with the proper key and lock for each teacher to enhance quality teaching-learning and improve the working environment of teachers.

Keywords: *School building, quality education, teaching-learning, infrastructure, classroom*

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Introduction

According to the MoE (2010) school infrastructure and school facilities include buildings, classrooms, laboratory, library, toilets, water, clinics, television, internet, conference hall and cafeteria etc. It is a fact that school buildings and classrooms are critical components that contribute towards quality education. Physical infrastructure such as school building and classroom impact the daily chores of students and teachers. There is a direct relationship between physical infrastructures such as school building, classroom, toilets etc on the teaching-learning outcome (Ngwaru & Oluga, 2015) and pedagogical process (Dorji, 2020a). The infrastructure must be perfectly put in place for teaching-learning and ultimately leading in shaping the minds of the students in the right approach for a better future and better citizenry. It is through education under inviting buildings and classrooms that the nation obtains human

resource to serve in various organization. For better teaching-learning, the infrastructure needs to be well planned and well furnished. In addition, moving space, visibility, audibility, and ventilation are important determinants of teaching-learning in the school. The infrastructure environment such as a hanging pole, cracked wall, broken chair and table, broken floor, and broken window impede effective teaching-learning and quality of education.

The development philosophy of Bhutan, Gross National Happiness (GNH) emphasizes wellness and wellbeing of mental, spiritual, physical, social, economic, political and environmental spheres. Education is the core instrument in achieving national vision, goals and values. Such aspirations can be achieved if dramatic steps are taken to improve the physical infrastructure of schools. According to UNESCO (2015, p.18) "quality education must contribute to the personal fulfilment and happiness of learners as well as to individual and societal well-being".

Sustainability is critical for GNH. Construction organizations are key organizations for sustainable development (Emami, Marteinsson & Heinonen, 2016). MoE faces numerous challenges in building school buildings and classrooms of high-quality structure, disable friendly, and seismic resilient (MoE, 2020a). The Twelfth Five Year Plan (2018-2023) recommends the construction organization to improve quality infrastructure (GNHC, 2019). If the infrastructure does not inspire the students, teachers and parents the innovation and creativity of infrastructure can be questioned. Students feel happy and proud to study in good school buildings and classrooms. Teaching-learning in good infrastructure has the power to reshape students thinking on infrastructure. The quality of physical infrastructure available in the school will determine the kind of future citizen (MoE, 2014) that will be produced. In the fast-changing digital globalized world, GNH values must be embedded in the school physical infrastructure.

The government view education as one of the fundamental means to achieve GNH and accords the highest priority on education as an engine for nation-building. Investment in school infrastructure is one of the strong frameworks for high performing schools to deliver quality teaching-learning. A good construction framework provides specific objectives for what types of classrooms are supposed to be constructed in schools. It aligns construction with the goal of the nation at par with performance standards across the world. Bhutan construction development policies, especially schools must take account of the emerging economy. As Bhutan drives towards a knowledge-based society, it is time for Bhutan to create innovative and sustainable infrastructure. It is also time to focus more on equity rather than equality (iDiscoveri Education & REC, 2009).

According to Neilson and Zimmerman (2011, p. 30) "school construction differs from

choice-based policies because students do not have to opt-in". However, responsive or effective school do not look the same. The school infrastructure needs to support the curriculum to meet the target set in the academic plan. Sanoff (1994, p.1) argue that "Educational philosopher John Dewey, urged that the learning environment be humane and attentive to individual children's needs". Students and teachers spend five to eight hours a day in schools. There is strong evidence that the construction of good schools leads to sustained gains in reading scores for students in elementary and middle secondary schools. To make a meaningful school, the construction organizations need to provide space such as computer laboratories, visual rooms, meeting areas and infirmary, art and culture centre, library, and playgrounds for physical, social, emotional, and academic development for students and teachers. The classroom needs to reflect the student-centric teaching methodologies. The classroom design, furniture set up and the size of the classroom should be suitable for teaching-learning. The recommended ideal size of a classroom is 24 for primary school and 30 for secondary school (iDiscoveri Education and REC, 2009; Dorji, 2020b). School buildings and classroom space convey the message of inner life, social values and activities of who created building and who used building (Sanoff, 1994).

According to the REC (2018) buildings occupy a huge share of land use, water consumption, energy use, waste production, and carbon dioxide emission. It is important to consider a green building for sustainable development. The green building consists of insulating walls, automatic light shut-off switches. Green building uses a light-emitting diode (LED) bulb and proper heating, ventilation, and air-conditioning systems. The construction materials are environmental and user friendly. There are wide ranges of benefit for constructing the green building in schools. According to Varma, Chaurasia, Shukla and Ahmen, (2014, p.1) "green buildings account for improving environmental footprint by reducing energy use by 30-5%, carbon dioxide emissions by 35%, waste output by 70% and water usage by 40%". Today green building architectures are widely used in schools with natural daylighting and views to promote the wellbeing of teachers and students (Varma, et.al., 2014; MoE, 2020).

The study by the iDiscoveri Education and REC (2009) in Bhutan found that many classrooms lack essential design, resources, and infrastructure for an engaging and comfortable environment for teaching-learning. The study revealed that on average the classroom dimension was 22 feet by 23 feet. Most of the classrooms were overcrowded with the sheer size of students and small classroom space. The study also revealed that there was a leaking roof and cracked walls in various classes. Classroom lighting was insufficient. The study recommended the MoE to supply age-appropriate furniture for students and proper lighting in the classrooms.

A recent study by Dorji (2020a) in Thimphu Thromde, Bhutan revealed that there was an

absence of adequate gender-friendly toilets with regular clean water, soap, sanitary bins and wear for menstrual hygiene. There was less number of toilets due to the sheer size of students and limited recess time of 10 minutes. The study, therefore, recommended mounting workshops to create awareness on gender-responsiveness and gender-friendly toilets in the school.

Although the school buildings should maximize learning, promote intellectual, creative and growth, lift the spirits of teachers and students, the lack of financial resources to create good essential infrastructure in schools is a challenge (MoE, 2020a). Schools cannot remain deficient in good school building and classroom in the 21st century (MoE, 2014). The SDG 4 'ensure inclusive and equitable quality education and promote lifelong learning opportunities for all' requires a collective commitment of the education sector through bold and innovative actions.

Significance of the Study

The vision of Education 2030 reaffirms that 'education is a public goods' (UNESCO, 2015, p.12) and merit goods (MoE, 2013). Education is a fundamental human right for people. The study will be significant to draw policy attention to school design and construction. The findings from the study can sensitize policymakers and construction organizations that engage in building and classroom construction. The outcome and impact of teaching-learning are dependent on the quality of an inviting school building and classrooms.

Objective of the Study

According to UNESCO (2015, p.18) "quality education should not be narrowly defined by just learning outcomes that are most easily measured". The school buildings and classrooms needed to be studied so that improvement and modification in school building and classroom can be done as necessary. Therefore, the objective of the study is to:
examine physical school infrastructure because school building and classroom can be a determinant of teaching-learning.

Research Question

1. How are the existing physical infrastructure in schools conducive to quality education?

Data and Method

The study was exploratory using qualitative study techniques. The data was collected through observation of school buildings and classrooms. The observation was carried out to gain first-hand experience in a natural setting of the school building, classroom and identify common

patterns in structure and displays (University of Bradford School of Management, n.d).

There are four public higher secondary schools, five public middle secondary schools, four public lower secondary schools, and five public primary schools under the Thimphu Thromde. Through lucky dip, two higher secondary schools, one middle secondary schools, one lower secondary school, and one primary school each were randomly selected for the study. Desk review of related materials and documents were done to substantiate and increase the insight of the findings and discussion.

The schools were coded as 001, 002, 003, 004 and 005 to hide their identity. The analysis of the observation data was done using basic content analysis or thematic analysis. The observation data were matched with secondary data from a desk review of studies in the past to examine similar trends and conclusion.

Findings and Discussion

Upon analyzing the observation data using the content or thematic analysis, twelve themes were drawn as follows:

1. Location of building

In school 001, 003 and 004, school buildings were found close together. There were no emergency exit doors in classrooms during a disaster. Schools may have risks from fire, but fire safety was absent in all schools. Fire extinguishers were hardly seen in the schools. The available fire extinguishers in the schools were non-functional. A separate water tank and water distribution for firefighting are not available in schools. There is the absence of vehicular access for students, teachers, deliveries and access for ambulance and fire fighting vehicles in many schools. For instance, school 001 and 003 were not accessible to vehicles due to the presence of walls, steep steps, building and canopy among many others. Safety measures are needed to prevent potentially disastrous accidents. Access to and within the school are not inclusive for disabilities and elderly people. All buildings floors are inaccessible to disabled users.

2. Building wall

It was surprising to see cracks in new buildings and around windows. All new school buildings had cracks on the walls and around the windows. School 001, 003 and 005 had cracked walls. To facilitate better teaching-learning and safety, school building walls and windows should be free of cracks. The presence of such cracks on the wall might encourage students to practice such culture in near future.

3. Natural ventilation

All school buildings in Bhutan have the same structure. The school have large windows and doors for natural ventilation. Classroom lightning was found not sufficient in the old-school building. According to MoE (2020a) natural ventilation control internal temperature during summer. However, the present natural ventilation does not control temperature during winter especially in schools in colder regions of Bhutan. It was observed that there was no proper winter heat insulation in the schools. To create a positive physical learning environment, proper winter heat insulation was required in the classrooms.

4. Building floor and lighting

During the observation, the researcher observed a few broken windows, doors without latches, broken wooden floors and broken furniture. In school 001, 003 and 005 there were few graffiti on the walls. The school walls were not painted uniformly. There is no policy regarding the school wall and classroom painting. All old-school building does not have proper ventilated or good lighting facilities. To facilitate better teaching-learning school buildings need adequate and natural classroom lighting. LED bulbs were not used in the classroom while most bulbs would not light due to lose connections or the bulbs are dead.

5. Tall trees

During the observation, 003 school was covered by tall and big trees. The school was proud of natural sources. A beautiful green campus is essential for teaching-learning. The researcher found the environment was welcoming and inviting. Under such an environment, teaching-learning became an enriching and joyful experience. Deciduous trees provide more shade in summer and help prevent direct summer sun into the building and might allow the sun in the building during winter. However, the school must take precaution about the big trees. There could be a risk to students and school infrastructure especially during autumn and spring when the weather gets stormy and windy. Old branches could break and trees might fall. The falling leaves of deciduous trees add to the social workload for students during autumn and winter sessions. All schools carry out ten to fifteen minutes of social work by students before the start of the classes.

6. Physical appearance of school building and classroom

Although Thimphu Thromde is in the capital city of Bhutan there is no iconic school

building and classrooms. The researcher felt some of the schools located in the countryside are far better than schools in Thimphu Thromde in terms of infrastructure, structure and resources. Most of the infrastructure in the observed schools require immediate maintenance. The school infrastructure should be seismic resilient, user-friendly, and of high quality with space for academic, technology, physical, social and emotional development of teachers and students. School or classroom are the second home for teachers and students.

In the 21st century, schools cannot be separated from technology in education. However, it was observed that classrooms are not equipped to hold ICT based teaching-learning. The basic fundamental of teaching-learning was to deliver high quality and raise the bar of teaching-learning in the schools. According to UNESCO (2015) digital technologies are demonstrated in the classroom across the globe to empower teachers and lifelong students to be innovator, responsible and competent citizens in the globalized world. With effective technology provision in the classroom, teaching-learning can be enhanced, deepen, accelerate, and create an ICT knowledge-based society.

7. Staffroom

All staff rooms were found with the same kind of structure across the schools. Staff rooms are space for the teachers to interact and share their practices, knowledge and socialize. A staff room is also a place where teachers prepare their daily lesson plans, check students' assignments, read and carry out projects. The staffrooms were crowded that there is no room for privacy, quiet, and academic stations. 60 percent of the current staff room has a handful of adequate storage shelves and cupboards available for teachers. 70 percent of schools have no proper lockers to keep property safe in the staffrooms. The present staffrooms do not promote academic cultures such as concentrating teachers on work, reflection and critical inquiry on their teaching practices, small group meetings and meetings with students.

8. Alternative source of energy

All schools depend on hydropower as the main source of energy. Other alternative sources of energy such as solar energy etc. were not used in the schools. The school should prioritize the use of solar energy to heat rooms and water during winter.

9. Dining hall and conference hall

Since all public schools under Thimphu Thromde are day schools, there was no dining hall for lunch. All students were found eating lunch in their respective classes or in the assembly

ground or parking area or in the shade of trees. During rainy and windy days, students cram the corridors for a place to dine. Dogs were found around students during lunch break. In many cases, Multi-Purpose Hall is occupied with other activities in the schools. There is no cafeteria included in the school building plan as shared by four principals during the casual discussion. Conference halls where staff meetings and professional development sessions could be held were not available in the schools. Often meetings and professional development programmes were conducted in the school multi-purpose halls. Since there are no acoustic materials used in the multi-purpose halls, speakers' voice is scattered or echoed making it inaudible and unclear.

10. Health room

All schools have a dedicated health room with one or two beds. The heath room does not have attached washrooms. Both boys and girls were kept in the same rooms. The basic medicinal needs and first aid kit were found in the school. Health rooms are located not close to the staffroom to monitor sick students.

11. Toilets

During the observation, it was observed that toilets were all accessible and convenient for the students. There were separate toilets for boys and girls. However, in schools 001, 002 and 003 toilets were located close to each other and there was no privacy. There is an absence of sufficient lighting in the toilets. The urination provision is open and there is no separate compartment to pee. The urinals need attention. According to MoE (2020a, p. 117)

> the minimum number of toilets planned should be one per 20 girls and one for female staff; one toilet plus one urinal per 40 boys, and one for male staff. When possible, this provision shall be doubled for primary schools (i.e. 1 toilet per 10 girls and 1 toilet plus 1 urinal per 20 boys). At least one toilet cubicle should be accessible for staff and children with disabilities, preferably one for females and one for males.

However, during observation, the researcher observed the recess period in the schools were ten minutes and the lunch break in school is around 30 to 40 minutes which is insufficient for the students. Female students need more time in the toilet due to biological reasons and thus time taken by girls is comparatively longer than that of boys. The pad bin for disposal of used sanitary pads was not found in the girls' toilets. Many girls coming from poor socio-economic family background cannot afford sanitary pads and hence are often found to be missing classes

during menstruation. This will affect their learning outcomes and classroom teaching-learning concentration. Special provisions were required for girls' toilet for sanitary disposal. Safe, healthy and secure school environment safeguard students from health hazards. Proper sanitation and toilets might enable students to become agents of change for improving sanitation and hygiene practices in communities. The community can draw inspiration from the students.

12. Class size

An inviting classroom includes age-appropriate furniture, class set up and the size of the classroom. On average 20 percent of classes observed were not adequately equipped with age-appropriate furniture. For instance, schools 001 and 005 had tables and chairs too small for grade 6 students and students were sitting too close with each other, thus limiting space to work during the teaching-learning process.

The classrooms were found overcrowded in many schools. All classrooms including old and new school buildings were small due to the sheer size of students. The iDiscoveri and REC (2009) recommended 24 students in the primary school classrooms and 30 students in a secondary school class with a size of 1.5 square metres per student. It was observed that many classes had more than 35 students. For instance, schools 001 and 002 had limited space for students to move around during-teaching learning process due to having a sheer size of students. The current class size with poor classroom design might lead to poor execution of the meaningful teaching-learning process in the classroom. The classroom size revealed that teaching-learning in Bhutan can be teacher- direct and teacher-centred. According to Halstead (1992) as cited in Sanoff (1994) outlined classroom of tomorrow need to look like a studio with a workspace for cooperative learning by different groups, a private place for one to one session, other innovative places for students to work independently. The buildings and classrooms would determine how students and the community would think and act in the future. This means that school building and classrooms play an important role in moulding and building future citizens for nation-building. Consequently, policymakers and bureaucrats must understand the current context of a fast-changing world and everybody needs to be guided by ethics, values and principles.

The findings and discussion of the study were consistent with the previous study done on the quality of school education in Bhutan: reality and opportunities by iDiscoveri Education & REC (2009). After eleven years later, this study discovers similar shortcomings in its findings and patterns. The gap remains the same because there was a lack of clear communication and coordination among different stakeholders. There was a lack of a clear shared goal, objective and

vision for the education system. The findings of the previous study were not well disseminated to the concerned organization. The MoE need to engage all relevant stakeholders with a compelling vision and set a clear goal and translate goals to achieve the vision of education. In Bhutan, the poor physical infrastructure of school building and classroom are unfortunately tolerated and assumed as normal practices. Teachers, parents, students, bureaucrats and policymakers were not aware and hardly recognize its impact on pedagogical practices and learning outcomes.

Finding from this study confirmed an earlier study of Dorji (2020a) that there is the absence of gender-responsive and gender-friendly toilets in the school.

Conclusion and Recommendation

Gauging by the evidence of the study all school buildings have the same structure. The classrooms were found overcrowded in many cases. New school buildings have large windows and doors. The LED bulbs were not used in the classroom. Proper winter heat insulations are missing in all schools. Some school environment was welcoming and inviting with deciduous trees and flowers around the schools. All schools have a dedicated health room with one or two beds. The heath rooms do not have attached washrooms. All the schools have staffroom with varying size and conditions with no room for privacy and academic stations. There is no emergency exit door for classrooms or working fire extinguishers in cases of emergencies. There is an absence of vehicular access for students, teachers, deliveries and access for ambulance and fire engine in many schools.

A sufficient lighting system is absent in the toilet. The urination provision is open and there is no separate compartment for both boys and girls. The toilets floors are wet and slippery. There is no menstrual hygiene management room with continuous running water and proper drainage of wastewater inside the toilets. The disposal of the pad bin was not found in the toilets. There were no proper dining halls for lunch in schools. In many cases, Multi-Purpose Halls are occupied with other activities in the schools.

To enhance and ensure quality teaching-learning in the school the study recommended the MoE:

- revisit and rethink school building designs and guidelines without territorial, defensive and sensitive to criticisms. The school building design and guidelines need to ensure not only on papers but in practice and implementation. The construction company should be held accountable for poor quality building.
- include students, parents and teachers as a part of the decision-making process. The

voices of student, teacher and parent need to be heard and must inform policy dialogue, consultation and collaboration to improve working conditions. Rather than working in silos, it is necessary to work together at this juncture for greater collaboration, robust and holistic approach to serve the greater cause. Policymakers, bureaucrats and construction organizations are not considered experts in designing school building and classroom in many ways because they lack rigorous interaction, consultation, reflection, research and publication.

- create smart classrooms with ICT, overhead projector, white screen and computer screens along with the green board. In the era of science-based technology, classrooms need to be equipped with technology-based teaching-learning. The COVID-19 has left school with no choice but to turn to technology.
- incorporate temperature insulation building, conference hall and cafeteria especially to have effective teaching-learning. COVID-19 has extended academic session throughout the year.
- use LED bulb in the school to minimize cost. Rainwater harvesting systems and weather station should be incorporated with the construction of school buildings for holistic teaching-learning.
- need separate health room for both boys and girls with washroom attached near the staffrooms.
- model school buildings and classrooms that students can look up to rather than reinforce the conventional way of constructing schools. The quality of education is a multidimensional evolving concept and cannot narrowly be defined by learning outcomes alone.
- staffrooms need to be in the cubical room with the subject department. Each teacher should have one room space of 4-5 people for discussion with proper key and lock. Small group break-out spaces for teaching-learning need to be considered. Good and effective staff rooms enhance quality teaching-learning and improve the working environment of faculty and staff.

It is time to pursue education from a holistic approach. School building and classroom need to be robust and resilient. Investment in education is considered a long-term investment by all nations. Education budgets need to be enhanced and targeted better in school and classroom construction. Education is the solution to everything.

Limitation of the study

The study was carried out in public schools under Thimphu Thromde, Bhutan. Although the study used a small sample size, an honest effort was shared to reach a reasonable conclusion. Thus, the study can be generalized to some extent for all public schools in Bhutan

The location and orientation of buildings, hazard and disaster assessment, building security and access, water facilities and distribution networks, structural materials, water quality and plumbing, power distribution, parking space, footpath, administration unit, laboratories, staff quarters in the campus could not be studied due to limited expertise, time and resource. It is necessary to examine in action with a checklist to assess the quality of the school. The views of student, teacher, parent, policymaker, bureaucrats and construction organizations could not be collected. The national-level study needs to be carried out in the country to further generalize the findings and discussion.

Future researchers are recommended to adopt a mixed-method approach with a larger sample size. The mixed-method should comprise a survey questionnaire for students, teachers, parents, policymakers, bureaucrats and construction organization; focus group discussions with the same groups of participants and interview with policymakers and construction organizations are recommended to further validate the current findings and discussion.

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