CONTEMPORARY LEARNING SPACES: NORTH BANGKOK DEMONSTRATION SCHOOL

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วิทยานิพนธ์นี้เป็นส่วนหนึ่งของการศึกษาตามหลักสูตรปริญญาสถาปัตยกรรมศาสตรมหาบัณฑิต
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ธันยพร จันมา : พื้นที่การเรียนรู้ร่วมสมัย: โรงเรียนสาธิตนอร์ทกรุงเทพ (CONTEMPORARY LEARNING SPACES: NORTH BANGKOK DEMONSTRATION SCHOOL) อ.ที่ปรึกษาวิทยานิพนธ์หลัก: อ. ดร. ชมชน ฟูสินไพบูลย์, 152 หน้า.

โรงเรียนเป็นสถานที่เสริมสร้างการเรียนรู้ให้แก่เยาวชน ปัจจุบันเนื้อหาการเรียนและปรัชญาด้าน การศึกษา มีการพัฒนาก้าวตามเทคโนโลยีและสังคมที่เปลี่ยนแปลงไปอย่างรวดเร็ว แต่โรงเรียนส่วนใหญ่ มีอาคารเรียนและสภาพแวดล้อมไม่สอดคล้องและไม่สนับสนุนการเรียนรู้แบบร่วมสมัย ส่งผลให้ นักเรียนขาดโอกาสในการเรียนรู้อย่างเต็มประสิทธิภาพ

อย่างไรก็ตาม มีโรงเรียนจำนวนหนึ่งที่เริ่มหันมาให้ความสำคัญกับการออกแบบอาคารเรียน และ สิ่งแวดล้อมที่ส่งเสริมเนื้อหาการเรียนและปรัชญาด้านการศึกษาแบบใหม่ ซึ่งเป็นจุดเริ่มต้นของวิทยานิพนธ์นี้ ที่ศึกษาปัจจัยในการเลือกพื้นที่การเรียนรู้ของเด็กในชั้นประถมศึกษาปีที่ 1 ถึงชั้นประถม ศึกษาปีที่ 6 เพื่อให้ทราบว่าสภาพแวดล้อมของพื้นที่แบบใด และองค์ประกอบของสถาปัตยกรรมแบบ ไหนที่ส่งเสริมการเรียนรู้แบบร่วมสมัย โดยผลของการศึกษาด้วยการสังเกตุการณ์และวิเคราะห์เปรียบ เทียบกับทฤษฎีถูกนำมาใช้ในการออกแบบโรงเรียนสาธิตนอร์ทกรุงเทพ

จากการศึกษาวิเคราะห์และออกแบบดังกล่าว พบว่าปัจจัยที่ส่งเสริมให้นักเรียนใช้พื้นที่ของอาคารเรียน และสภาพแวดล้อมในการเรียนรู้แบบร่วมสมัยคือพื้นที่ที่มีความเป็นส่วนตัว มีบรรยากาศของสิ่งแวดล้อมที่ดี และมีความใกล้ชิดธรรมชาติ

สาขาวิชา การออกแบบสถาปัตยกรรม ลายมือชื่อนิสิต .....

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Schools are places to strengthen learning for youths. At present the content of academic and educational philosophy develops rapidly through technology and society changes but most schools buildings and environments are inconsistent and do not support contemporary learning. As a result, students lack the most effective learning opportunity.

However, there are a number of schools that pay attention to their architectural and environmental design to promote students' learning contents and new education philosophy leading to the starting point of this thesis. This thesis studied factors in selecting the learning spaces of Grade 1 – Grade 6 students in order to determine what kind of spaces and architectural elements promote contemporary learning. The outcome of the study based on observation and analysis compared to the theory being used in the design of North Bangkok Demonstration School.

The study of such analysis and design found that the factors that encourage students to use the spaces in the building and contemporary learning environment are privacy, appropriate environment and the proximity to nature.

Field of Study: Architectural Design Student's Signature .....
Academic Year: 2017 Advisor's Signature .....

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Introduction

1.1 Problem Statement and Research Significance

The problem that will be addressed here is that the 'Learning Space' in most Thai schools needs to be improved. At present, the educational curriculum and learning textbooks have been developed to cope with the change of the times. But in contrast, the places of study and their surroundings have not been developed in line with the format of the changing methods of teaching. The problem that can be seen in Thai schools is that the students do not utilize the space that is provided efficiently for all its benefits and intended functions, e.g. the library. Most of the students choose to enter their library facilities just to rest in an air-conditioned space, without the intention to actually study or learn. The architectural space does not support the new learning that has changed and improved. Because of the unimproved architectural space, therefore students may not get the best benefits. As Anne Taylor, a Professor and Director of The Institute for Environmental Education states, "The better way of learning is to combine the curricular and child development goals of education with the design elements of architecture"(A. Taylor, 2000).

North Bangkok Demonstration School is a selected place to explore the idea of contemporary learning space. "Contemporary learning space" in this research is defined as a type of learning space that responds to contemporary society and education. It should be adaptable and flexible learning space that would be accommodating learning activities at any time. It would support the new way of learning and promote activity sessions, which are major parts in North Bangkok Demonstration School project. It could both interact among students in school, parents or with community in the area. Most of the Thai educational institutions in Thailand have limited spaces for out-of-classroom learning, which is required for performing various activities. These activities are the guidelines to encouraging new types of

knowledge, leadership qualities and self-confidence. The activities in out-of-classroom learning needs to allow students to think and act by themselves, and do not limit their imagination by setting the rules for everything. Therefore not just learning process, but the space where the learning is taking place, must not limit students too. Students should have a chance to choose where they prefer to study; either outdoors or indoors.

From an issue that has been alluded to in the beginning about libraries, according to Kent and Myrick, students would probably engage better in learning if the library is a desirable place to study. Accordingly, libraries should provide comfortable spaces that accommodate the users' needs. This growing trend of library design incorporates the non-traditional way of learning with environments such as cafés, writing centers, classrooms, museums, student service centers, within a library. While the other groups of students who would like to perform group-tasks, do homework, or review lessons with friends, choose to create their own learning spaces elsewhere, such as along the grounds of sports complex, under the shade of big trees, or even along the stairs of buildings. Observed patterns clearly shows that most students tend to select their learning space during their free time based on atmosphere from the choices of spaces available on the school grounds. The outcome from this research will be the design solution for North Bangkok Demonstration School.

1.2 Research Questions

How to better design North Bangkok Demonstration School to support contemporary learning?

The sub questions are:

1. What are students' favorite spaces, both indoor and outdoor, that support their learning?
2. What are architectural elements that support students' learning?

1.3 Objectives

To find out that what kind of spaces or what architectural elements attract students into creating learning spaces for themselves. The research outcome can be classified into categories which will be suitable for use in designing the school for the future, or even to renovate parts of the school to keep up with the times.

1.4 Scope of the Study

- Limit the age-groups of the students to only be in the range of primary levels, in order to be able to focus more specifically on certain types of learning spaces and architectural elements.

- Study the growth of students, including their characteristics and the things that the students in primary level need for their development. In addition, the outcome of the study will be used as the supplement data for designing the type of architectural elements that have the suitable features for students' learning environments.

- Look for schools that have the concepts and projects to accommodate new formats of learning, in order to bring data to analyze for the merits and establish a similar format for design.

1.5 Research Methodology

This study will investigate mainly the most favorable spaces for children to study in, including the major elements that support children's learning. Understanding students' needs, and combining it with the educational core will finally form a design of desirable learning spaces for children, which can be categorized into 3 features of research methodology.

There are 3 features of research methodology as follows:

1. Literature Review

The research theory will help to understand student's characteristics in ages 6 to 12 clearly enough in order to prepare learning activities and development for this age group. Furthermore research on life-long educational visions will portray new styles of learning and teaching that will lead to both development of the students and the school's environment. Also connect that vision with the demonstration school vision, to see what they have in common, and do more research about the primary school's design. The information here will be concluded into the programs needed and the international standard dimension for each program will be as precise as possible.

2. Case Studies

Case studies observation is the important aspects of designing learning space for students in North Bangkok Demonstration School because in order to be able to design, enough tools and elements are needed. In this case the tools and elements will be the result from observation of favorable learning space of students. It is concluded as a table of architectural elements.

3. Design Research

In order to move to this aspect, the programs and vision of school need to be established, with consideration given to the site of school and surrounding environment. Also, the concluded categories of architectural elements from the case studies will be used to design the demonstration school. Furthermore, a comparison of each design study will be provided in this section to assess the suitability of each design.

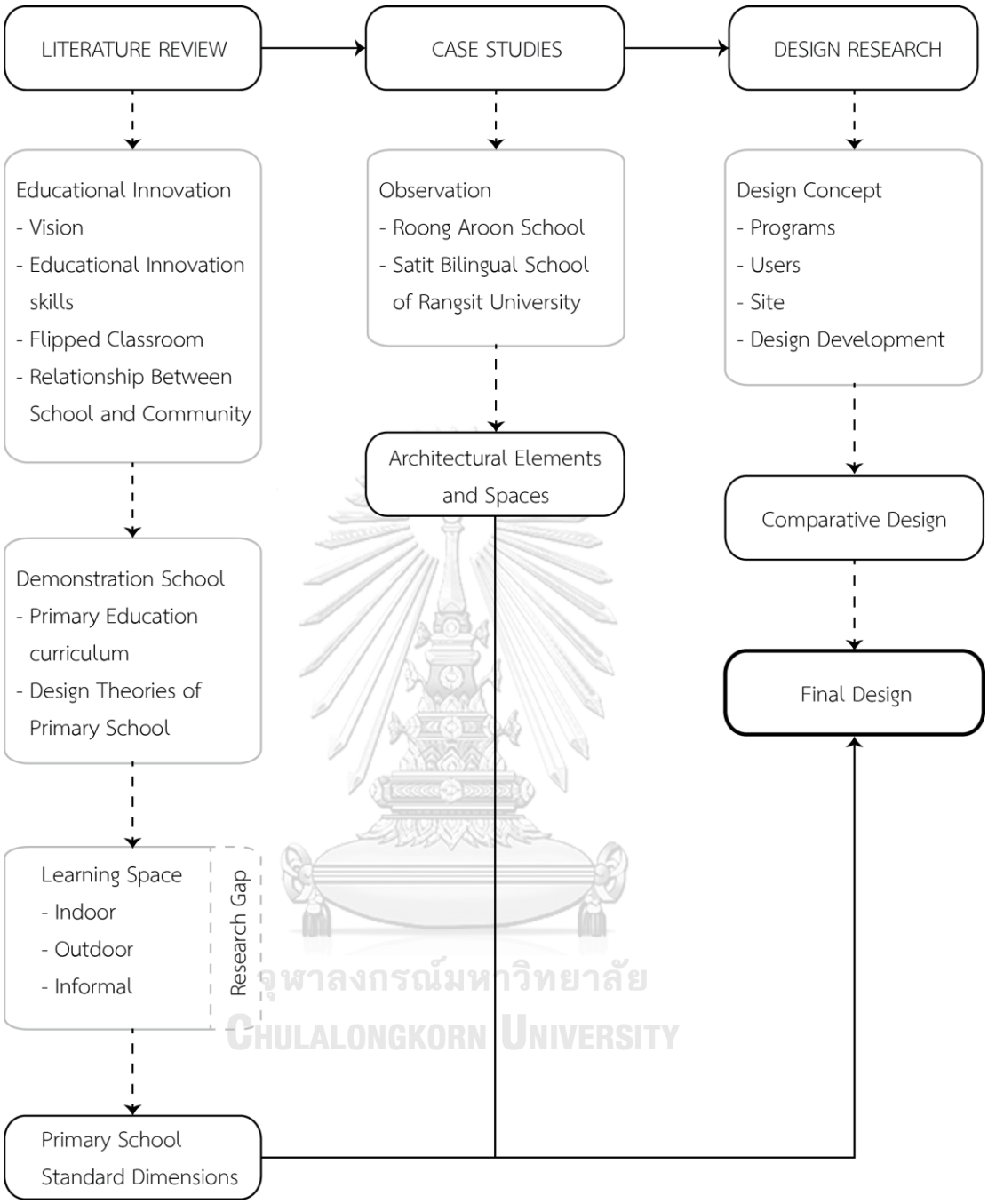


Figure 1. 1 Summary of research methodology

1.6 Benefit of the Study

This research will benefit both the students and teachers, from the standpoint of more efficiency in the processes of learning and teaching. It will also be a benefit to the architect and the school's owner whose work and property can become an innovative example of how study spaces should be designed efficiently and functionally to cater to the students' needs and preferences. This study will also help clarify answers to the question of how efficiently spaces in the school are being used, and how to improve them to cater to usage and needs of its inhabitants.

Chapter 2
Literature Reviews

This chapter of literature review is mainly separated to two parts. First part is about general idea of how to design a school. Talking about a school's components and what need to be considered. The second part is more specific on learning spaces and will talk about three spaces on which research has been conducted.

School, an educational place proposed to afford supportive learning spaces and learning environments for teachers and students to follow the school's curriculum. Many schools in Thailand are lacking supportive learning spaces. Some provided space doesn't fit with the way students learn or the way that students select space for study. The result is a waste of funds and a waste of valuable space that could be utilized for other functions to support school curricular. Understanding how to design school buildings is needed with consideration of qualities of function and cost efficiency. Furthermore, the guiding of designing school in detail is needed later on. For example, how the spaces flows, what an open classroom plan looks like or how to place each facility toward the sunlight.

Students' supportive learning space and learning environment can include outdoor learning spaces, indoor learning spaces and informal learning spaces, which are important topics that need to be considered and well understand before designing a school. Different spaces have different factors to be considered. Some spaces require consideration of design details such as furniture, doors, windows, layout or function but some for some spaces the relationship between people, acoustic voice or atmosphere are more important. However, they have similarities in that all spaces need consideration of nature, green space, relaxing environment, etc. in order to design effective student learning spaces.

2.1 Primary School

Starting with the layout of a primary school design, this is the basic idea to show the flow between each facility and space and to be able to understand the relationship between user and the facilities. This idea is to emphasize the balance that is established between quality of function and cost efficiency when designing a school.

2.1.1 Design Theories of Primary Education

Design Theories

Qualities of function and cost efficiency is needed when designing a school (Ministry of Education, Science and Technology, 2008). The figures below showing the basic idea of arranging the program.

First example of the functional diagram for primary school.

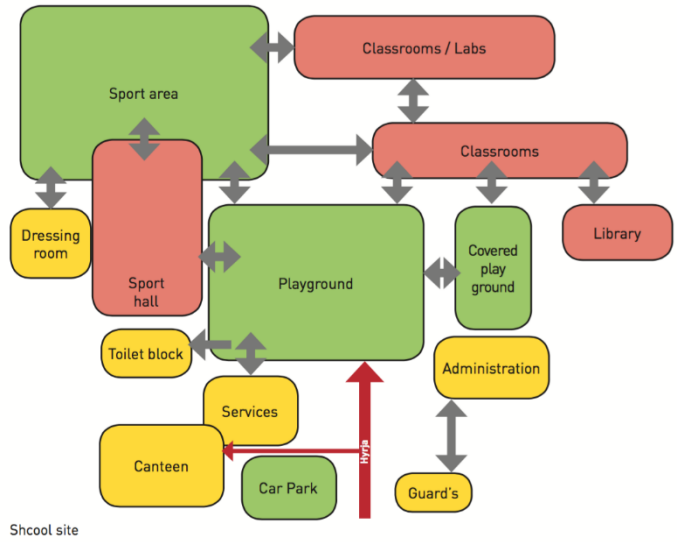


Figure 2. 1 One entrance functional diagram for primary school

Second example of the functional diagram for primary school

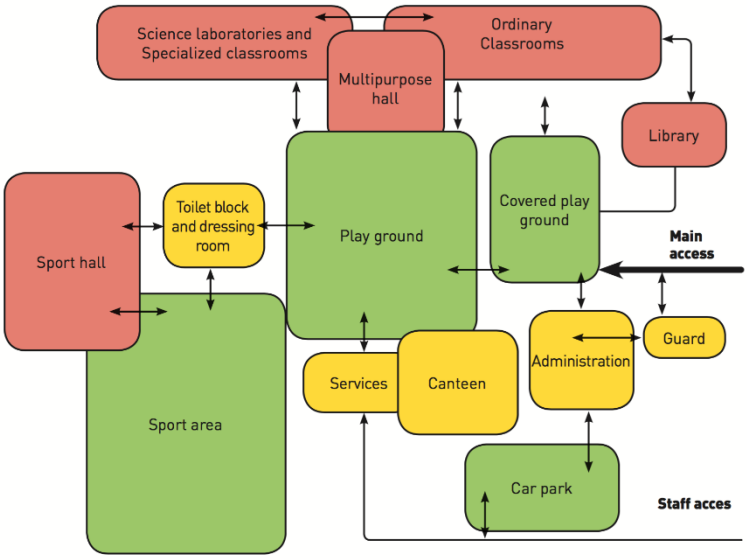


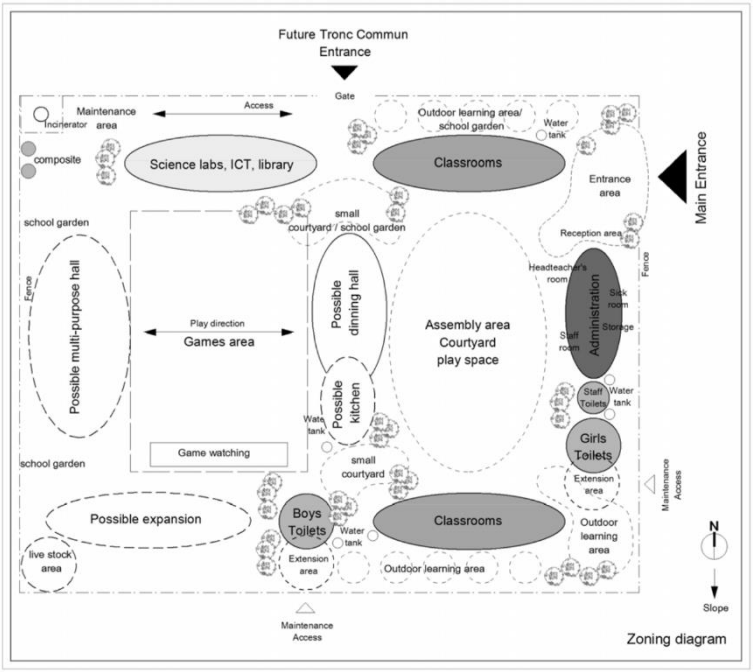
Figure 2. 2 To entrance functional diagram for primary school

Both types of example diagrams are influenced by dimensions of the space and the access to the school. Types and divisions of spaces in the given design programs above are designing with the structures that allowing for future development. Open Plan for easy adaptability and flexibility which is an important to study in the school design to accommodate the continuous development of educational thinking, building techniques, and technologies. This model will emphasize the opportunity for changed in layout and permits without excessive. According to the reason above, a flexible plan will support the changing for further improvement in space layouts, building structures, artificial lighting, and ventilation techniques and acoustics privacy (Ministry of Education, Science and Technology, 2008).

Beyond these two diagrams, the United Kingdom Department of Education has provided guidelines for future space arrangement of schools. The arrangement school facilities and activities has to be based on classrooms as they need enough lighting but no glare effect. Therefore, the classrooms should be orientated with windows that face toward north and south in order to avoid light penetration into classrooms.

According to this approach it will effect the position of entire building in school. As see in the picture below.

Figure 2. 3 School layout guideline of United Kingdom of Education



The diagram above is a zoning diagram represent a friendly atmosphere by introducing a large entrance area for welcoming and comfort aspect when entering the school space. Office building, staff room, teacher room, nurse room and storage is better to locate close to the entrance as a public facilities that allow visitor and community to access.

The central area is conducted with classroom and resource building, meeting hall, courtyard space as it is more private for student used. The various activity during the day will occur within this area the most. So the space should be design into an open plan for flexibility. Bathroom for students and staffs should be separate for privacy and visual aspect.

Gaming area is where people will gather in the area the most, should be located far away from classroom to avoid interrupted noise while they are having classes. Trees

and gardens are preventing elements for noise. Help to generate the acoustic and good atmosphere within the space.

Optimal Learning Space

1. Naturalness (Light, Sound, Temperature, Air Quality)

The growing trend in designing school link th connection between education achievement and students performance to the quality level of nature in schools. The Heschong Mahone Group (1999) found the positive impact of day lighting in school by observing 21,000 elementary school pupils and classifying 2,000 classrooms for different day-lighting levels among students. Resulting in twenty percent of student faster in math and twenty-six percent faster in reading(Group, 1999).

Firstly, natural lighting support a sense of concentration. Lower ceilings and deeper classrooms can effect students to experience a gloomy and drain feeling due to the disparity in light levels. Students who are spot at the back and front will experience the light in different level depends on the position of the windows as the main source of lighting should be sun lighting and supplemented by electric light when daylight fades. Library and art rooms, where only diffuse daylight is desirable, are located toward the North while the main learning area and teaching activity area can be to the South.

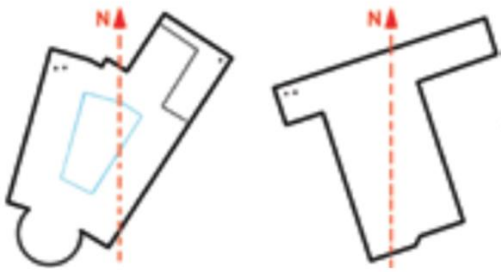


Figure 1: Building orientation of two primary schools in Manchester, UK; (Left) Green End Primary School; (Right) Rolls Crescent Primary School

Figure 2. 4 Building orientation of two primary schools in Manchester, UK; (Left) Green End Primary School; (Right) Rools Crescent Primary School

The example of similar plans are Green End and Rolls Crescent are two primary schools, both of them have long stretch building on axis toward the North and South. However, in Roll Crescent, the opposite side of their building axis are twisted toward different orientations and Green End also twisted into different angle to form a center atrium. The two design strategies lead to a great difference when it comes to the idea of sunlight receiving. The outcome are the classroom of Rolls Crescent can get direct sunlight not more than 3 hours per day in summer. In winter, the time is reduced to not more than 2 hours. However, in Green End, because of the void at the center, they receive more than 5 hours sunlight per day (Figure 2.5, 2.6).

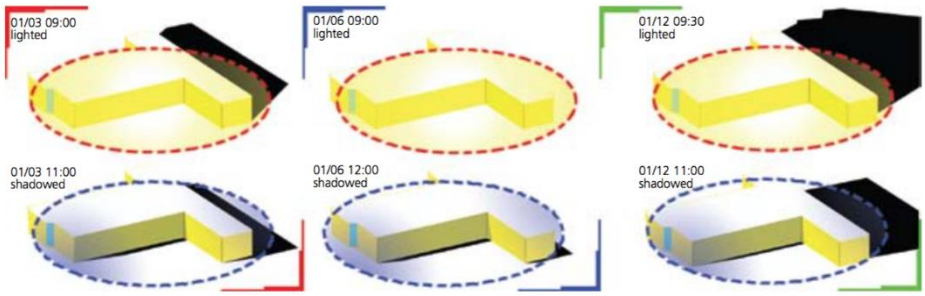


Figure 2. 5 Classrooms toward the northeast sunlight receiving in three seasonal days at Rolls Crescent (Confirmatory Case)

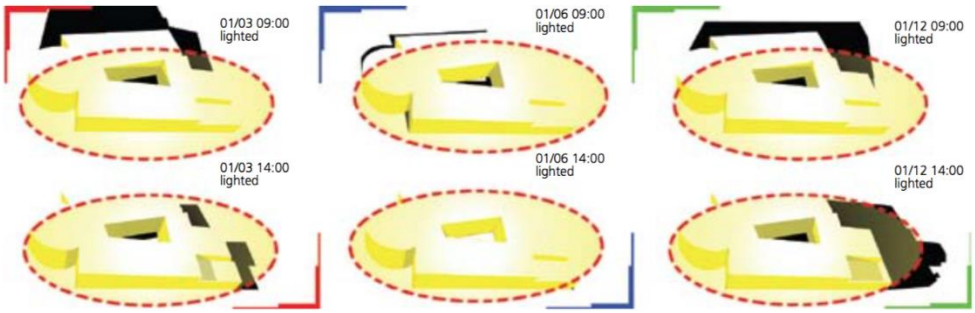


Figure 2. 6 Classrooms toward the southeast sunlight receiving in three seasonal days at Green End (Confirmatory Case)

Secondly, talking about sound, the ideal of designing school need no sound pollution as it concerned for student's concentration within an enclosed space. The space need to provide the support atmosphere for learning. The level of sound perception and the control of noise are two principal aspects to be considered. Those aspect will define the good or bad level of acoustic environment of a school. To improve the

communication skills between teachers and students, it need quiet and clear sound perception in an accepted level. This will promote teaching, learning and working proficiency. The necessary requirements for positive acoustics in learning spaces follow with three considered such as location, layout and rooms.

For the location, the environment around the school would impact to the quality of noise as road, rail and air transport, industry and traffic. Avoiding the noise pollution is need to be careful in first stage of putting school's layout. This can help reduce or eliminate the impact of noise from the surrounding environment in the area. Generally, the fundamental defense against the intrusion of noise lies in placing as much distance as possible between noise sources and the space where quiet is needed(Osbourn & Greeno, 1997). To prevent the undesirable noise, the garden or big trees in between would act as shield protecting noise.

Moving on to layout, room layout is also an important aspect to decrease noise from surrounding environment. The sensitive space that require high level of noise prevention such as classroom or learning hall can separate from the noisy space. The active room or space including music rooms, playrooms, playground and mechanical service rooms of the building should located in distance from the main spaces. Furthermore, a room itself also has an effect on the acoustic noise. Absorbent material such heavy curtains, soft chairs or carpet are good absorber of unwanted noise(Barrett & Zhang, 2009).

Lastly, temperature, humidity, air movement and human activity together are called thermal. Space heating and/or cooling loads, which are required to maintain this comfort, to some extent, depend on the building's quality itself to modify the external conditions and how far the outdoor conditions are from the acceptable range(Szokolay). There are three building design options practically, which have the greatest influence on thermal performance that is orientation, building layout and windows.

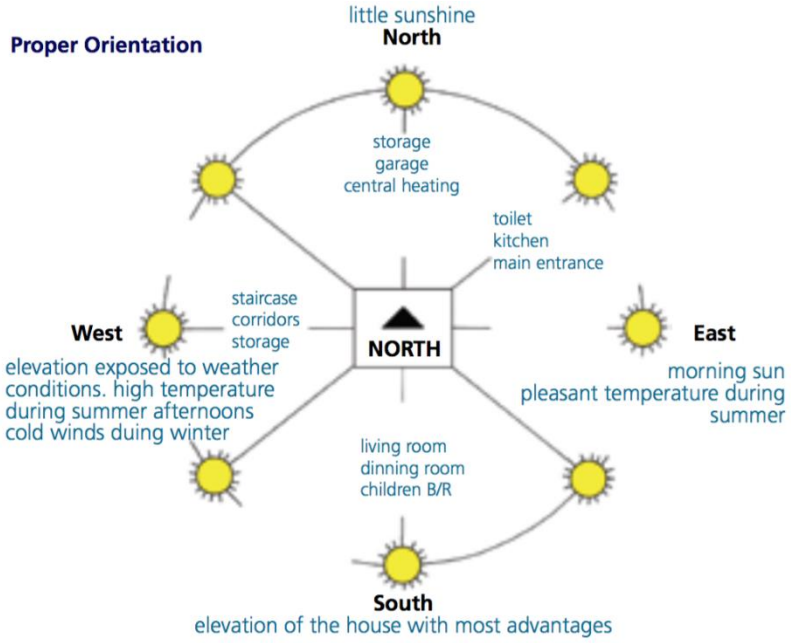


Figure 2. 7 Proper orientation of a building (north hemisphere)

Fundamentally the position of room controls timing of the amount of solar heat that is received, as pictured above. The rooms at the south orientation will be the hottest area. The rooms facing the west experience stronger and more intense sunlight and sun heat than those toward the east. The rooms toward north are the only side has received undirected sunlight. For example of the advantage use from southern sun, can see from the Davidson Elementary School. According to the Davidson Elementary School, all classroom have their own outdoor learning space which good for class supporting activity. Apart from that the large window of classroom were applied for receiving sunlight during lesson. Also, the stack up layout of classroom will reduce the strong heat during the day.

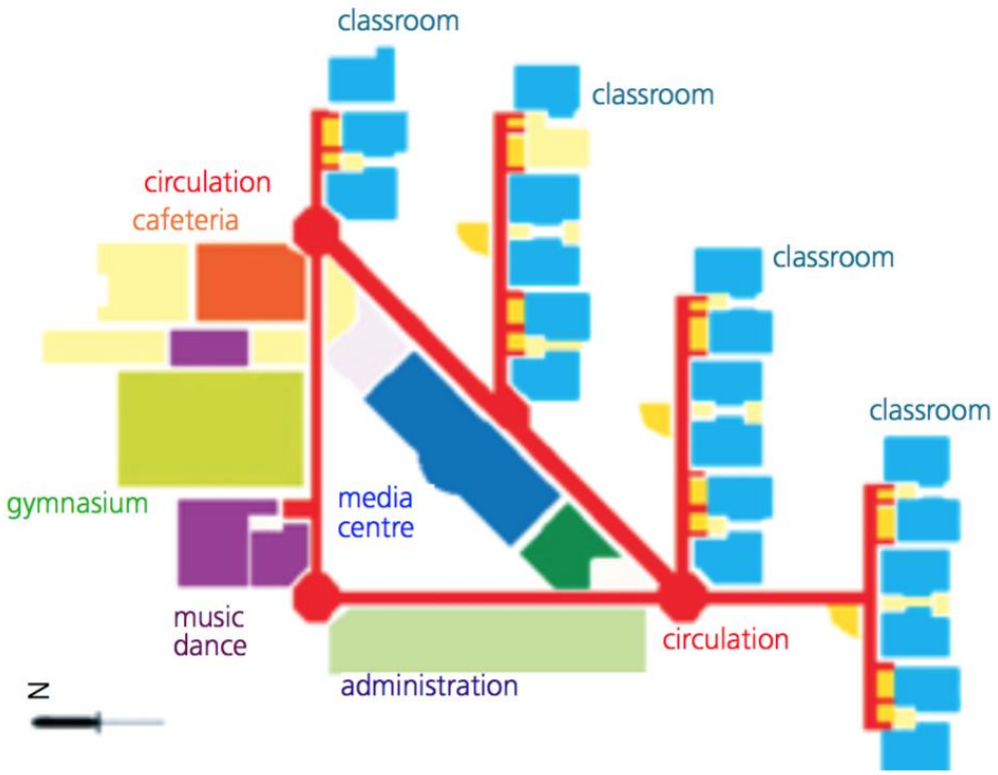


Figure 2. 8 Building plan (Davidson Elementary School, Charlotte, N. Carolina, US – Confirmatory Case)

Building layout is another factor that influenced temperature. The layout and form of building are normally linked together in order to generate building included size, height and pattern. The shape further determines the building's surface to volume rate, which is defined as the ratio of the area of external walls with respect to the volume of the building. Exchanging heat between the outside and the inside is directly proportional to the surface area. Therefore, any changes to the layout that increase the surface area exposed to the air outside will result in an increased heat exchange rate(Ogoli, 2003). The bigger surface area to volume of form may result in more heat loss with more exposed surface, however less heat gain due to self-shadowing. According to the information above, this suggests a group of building and simple plan which better in this context than a spread-out and complicated arrangement. Other strategies may accompany this such as additional insulation and attached buffer spaces to offset the heat loss due to increased surface area.

“The larger the window is the more the solar gain and the greater the heat loss”(Ward, 2004). The openings give the character to the architectural. Those opening included windows, doors and other openings which is critical objects to control as it is part of every rooms and programs that need the opening for heat, light, sound, air and view. Windows can receive heat and block heat in the same time represent as an important role in the thermal environment of the school.

2. Individualization (Choice, Flexibility, Connection)

People have their own mind set as personal pack of linkage between basic need and world need. Together with the nature of memory that is a general information of each people during each situation in their life time. With these different profiles, it lead to individual responses to environment such as space. According to the mentioned information before make ‘Individualization’ become the considered point in design. Apart from this it can divided up into two main points; particularization and personalization. Particularization is about things that people can learn, critical enough to be able to find the solution or analyzing things. For example, lesson during class or homework. Personalization is dealing about experience in life. For example, daily routine. The critical problems in designing school is to equal the personal space and building function to support education and technology development. Yet also need to support the changes in the future. The three key issues that were address in order to design school are choice, flexibility and connection(Barrett & Zhang, 2009).

Firstly, talking about choice, the fact that people are not the same for all character, outlook and behavior. From these differences, it should be the area to consider before design school layout and function. Students seeking for their own space when they are in the school. For example, they have their permanent table in classroom. This will make them feel secure and comfortable to stay at the table. According to this, the idea of creating forms and shape of each personal space within the designed area will lead to new experience of students. They will also increase sense of self and

ownership in school. As classroom is where students spend time with the most, rooms and windows are major design in this case.

To design according to the need of students, the size of space and elements in room can be accommodate to students. For example, the average height of students will guide the size of furniture in the room. By this students would feel closer with the elements around them. However, teacher needs also need to be consider in the design. University of California at Los Angeles (US) is a good example to show the room that accommodate both students and teachers. Classroom were divided up into multi zone to support various need of users. Active zone or quiet zone can be in the same space with boundary in between. The different level of ceiling and floor will determine that are the space for teacher and student. Even in some space were design to accommodate both teacher and student.

Figure 2. 9 Interior view of the main playroom with the lower and higher floor planes giving spatial drama to the activity

A good example from Pen Green Early Excellence Center (Corby, Northamptonshire, UK), showing the indoor activity space with the window design. In this case the window is smaller size and lower height especially for students. The positive things of lower height is that students would have good view of the outdoor environment from the glass wall that goes around the classroom. Adult would not receive the same view as students. This is boundary line between student space and teacher space that are meant to design.

Secondly, moving on to flexibility aspect, defining what is proper way to design school, classroom is the most important area that students usually spend time with. Classroom should be space that allow the adaptable furniture and programs, all the way through the organizational strategies and teaching strategies. Room is one practical option stands out for flexibility aspect. New version of school buildings aiming for an open floor plan and cellular classrooms as an option for student to be able to gain new experience and eager to explore and create their learning environment. For example, “the open-plan classroom would allow for as wide a variety of group learning sizes as possible and have learner groupings from an entire “family” of 30 or 40 learners, to groups of 12, 4-6 and 1-2 learners”(Barrett & Zhang, 2009). At the same time, each large-group, small-group, and individual learning space should be an architecturally well defined “activity pocket” with all the furniture, equipment, storage and resource for learning activity. The shared activity area here makes the teaching situation flexible, as the shared space is an extension of the classroom.

Classroom size is a problem of over crowed classroom; students can easily be over looked due to the size of the class. High density of children in “little space can lead to excess levels of stimulation, stress and arousal, reductions in desired privacy levels and loss of control”(Wohlwill & VanVliet, 2013). For example, the design of Redbrook Hayes Community Primary School in Rugeley, Staffordshire, UK pays much attention to bringing as many as learning spaces as possible into the heart of the school so that children and staff are in constant contact with daily school activities as picture below.

Figure 2. 10 The open space classroom of Redbrool Haes Community Primary School

Large classroom with varied learning groups and spaces (Redbrook Hayes Community Primary School, Regeley, Staffordshire, UK- Confirmatory Case), each classroom has its own children's toilets, kitchen area, generous range of storage and integrated ICT. Doors lead out to run-in-run-out play areas from each classroom. Moreover in the center of school, there are various kind of group space that support for small group work in order to level up the flow and flexibility in the room.

For the classroom layout, according to the study of Lipppman(Lippman, 2002), emphasized about a difference kinds of spaces within a classroom that would enhance good relationship between student-teacher/child-adult relationships. With the understanding that schools are learning center development, he suggested for the modern classroom criteria as follow. Firstly, small group would work perfectly if it can handle the formative and functional subject while having the idea of separation. Knowing that every kind of group work are easy to distract and resulting in non-productive work. However, the space need to be flexible and adaptable enough to continuous the class lesson. This means the space must be as free as possible for routine class. Moreover, controlling by a single teacher who has command of the entire space, means that the space must be compact and open(Dyck, 1994).

Thirdly, when talking about connection aspect it involves with pathways between spaces within the school building(Barrett & Zhang, 2009). Safety, easy movement and allowing surveillance are three basic requirements. Not just connecting between pathways and spaces but also connecting between school and community functions. The two aspects are emphasized which are circulation and location. The circulation within school, clearly marked pathways to activity areas improve the utilization of spaces. Also, help keep the children oriented and stimulate their imaginations(Alexander, 2012). Creating activity nodes between pathways can also increase opportunities for extra learning and positive social interaction.

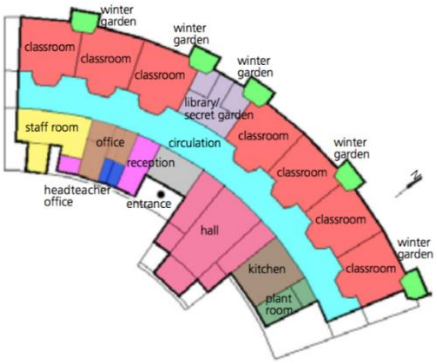


Figure 2. 11 School, Norwich, UK – Illustrative Case

The school follows a curved plan with a central corridor, clear and simple (Kingsmead Primary). The Kingsmead Primary School has seven classes with 212 pupils. The building plan and overall form is deceptively simple. The floor plan for this school is based on a curved shape. Specialist spaces which are most likely to be used with pupils and teaching staff. The corridor has been made an asset by providing rooflighting and display areas along it. Bright colors, such as blue, green, red etc. have been used to create identity for young children. The winter garden area exphasis on collaborative work and the recognition of the need to accommodate multiple learning styles.

For the location, when it comes to planning schools as community learning center, much has been emphasized in terms of making school resources available to the wider community, for example, by co-location additional services such as early year's facilities, health and adult training(95, 2002). However, there is another important aspect of the relationship between local community and schools. Learning things in the classroom and then seeing them in real life outside the school is often a much more powerful, practical way of remembering and understanding than simply learning from a lesson alone. Some of the external experiences children could take to engender learning in action may include botanical garden, old building, museum, galleries and theater. Botanical gardens can be part of environmental leaning, ecology, biology and science class. An old building or ruin building can involve in part of history lessons. All

kinds of theme museums and galleries can take action in art class, design studio and science class. Theatre can be stage for community service and English lesson on plays.

3. Level of Stimulation (Complexity and Texture)

In school, classrooms may need a different approach from assembly areas. Thus, a link can be seen here with the issue of individualization, stressing the holistic nature of design solutions. Research confirms many aspects of human emotional response to buildings and places (Hanyu, 1993; Mahnke, 1996; Nasar, 1992). For a school design, three points stand out in occupants' sensation, perception and evaluation of the physical environment such as complexity, color and texture.

Firstly, complexity of building has to do with appearance; the architectural exterior is the first impression of the school and presents a unique opportunity to inspire pupils and teachers. Diversity and order are two things that are important to aspect of appearance. Diversity can offer visual choices of shape and form. A regular box is not the only answer. Adjustments to the geometry of space can balance hard and soft forms, asymmetrical and symmetrical patters, creating visual and tactile interest. According to this, it raises another perspective which is information processing(Kaplan & Kaplan, 1989).

Hosmarinpuisto School and Day Center is located in Espoo Finland. Long exterior eaves provide shelter from rain and large canopies give safe spaces for playing at the sides of the building. The architect, Yrjo Suonto has adapted a highly expressive architectural form that can be interpreted as a dramatic strength and creative energy of students, staff and visitors. In the courtyard, circulation is by a gangway around the perimeter, and by a wood and glass bridge that links the school to the cafeteria and office. The yard visually connects the upper and lower levels and provides a flexible gathering space, a communal center, an outdoor play area and a space to relax. According to Whyte's (1980) research, people are attracted to places called livable spaces that have a view full of vitality and abundant information(Whyte, 1980). The presence of people

increases preferences for scenes, as people generally enjoy watching one another. Places to sit with such views always tend to attract people, as does activity.

Figure 2. 12 (Left) Two-story wood building with simple roof forms but sufficient detailing of fence, shading devices and long eaves to provide visual richness; (Right) Large canopies between the inside and outside increases the spatial experience and allow children to play safely on all sides of the building. (Hosmarinpuisto School and Day Care Center, Espoo, Finland)

Figure 2. 13 Livable space (Hosmarinpuisto School and Day Care Center, Espoo, Finland)

Ordering is important too. People's preference is often associated with increase in order and related variables, such as unity, coherence, clarity, compatibility and legibility. Features that may contribute to order include uniform texture, distinctive elements, focal point, low contrast in the color, size, texture and shape of elements or between objects and their background and also the replication of façade features(Wohlwill, 1982).

Lastly, texture, Nasar (1984) found that people normally perceive two styles of environment as having distinct features from one another, which are natural elements and obtrusive built elements(Nasar, 1984). The natural elements are flowers, plants, grass and water. The obtrusive built elements are intense land use, high style building and busy traffic etc.

People have a 'natural' positive response to texture as well as desire to make built features. Texture can be manipulated is scale from coarse to fine and can be used in juxtaposition or in gradients from rough to smooth, for example, from a branch of red flowers to piece of green glazing(Dee, 2004). For example, 'Soft' texture animates landscapes and enables people to connect what they see with their senses of touch, as texture, like color, provided unity and diversity in the surface of forms(Barrett & Zhang, 2009). The important point is outdoor space. Research indicates that the quality of life in a school is much enhanced when an abundance of useable outdoor space is present. The variety can add to the aesthetic appeal of places, enhanced as environmental conditions change with the seasons. There are also many practical applications, such as encouraging children's interest in thinking and asking to promote the goals of recreational activities; enhancing physical and cognitive development; encouraging imaginative play and stimulation empathy.

2.2 Learning Spaces

This study is concerned with development of an effective learning space, especially focusing on the architectural and space usage elements of the learning space. "A

learning space can be defined broadly as the physical setting of learning"(Thom, 2012). This refers to the physical environment, including natural and architectural elements, as well as decoration, fixtures and fittings, and comfort (e.g. ventilation, light, and so on)(Thom, 2012). In traditional Western pedagogies, the learning space has been strictly defined as a classroom setting; however, changes in learning and teaching have broadened the concept of the learning space to include outdoor learning spaces (as part of nature-based pedagogies) and informal learning spaces(Thom, 2012). Here, three key types of learning space are explored – the indoor learning space, outdoor learning space, and informal learning space.

2.2.1 Indoor Learning Spaces

The most common type of learning space in a modern school system is the indoor learning space, which can include the regular classrooms and supplementary spaces such as computer laboratories and science laboratories(Thom, 2012). Concern with classroom design dates to at least the 1960s, when the Santa Monica Project began to examine how traditional classrooms could be improved to better meet the needs of children with emotional or developmental delays(Hewett, Taylor, & Artuso, 1969). Although this research was mainly concerned with classroom management techniques, the authors also addressed the arrangement of the classroom and how this arrangement influenced factors like attention and behavior(Hewett et al., 1969). By the 1980s, it was well established that the physical environment of the classroom would influence the learning experience(Weinstein, 1981).

Weinstein (1981) established four key assumptions or tenets about the role of the classroom design in the learning experience. First, she argued that the classroom design exerted both direct influence and symbolic influence on the learning experience, including factors like student-teacher interaction and class participation. This led to the second assumption, which was that the functional environment of the classroom was important. Third, it can be assumed that the classroom environment must be tailored to the teaching methods and objectives of the class: a small participation-

based class should not be held in the same classroom as a large lecture. Finally, “the physical setting of a classroom constitutes an external condition that must be arranged as systematically as the other elements of the stimulus situation”(Weinstein, 1981).Through this study and others that followed, it was clearly established that the design and arrangement of an indoor learning space was critical to the learning experience and must be customized to the teaching objectives and goals.

Weinstein’s (1981) assertion was a clear break from traditional classroom design principles, which featured teaching from the front and gave little thought to student space or offered room for participation(Thom, 2012). The principles of classroom design have been extended in the open classroom, which deliberately rejects the traditional, authoritarian classroom and instead substitutes an open, flexible space that can be used in different ways(Alterator & Deed, 2013). Open learning spaces, which can range from flexible classroom sizes up to entire open-plan schools, has been shown to change teaching practice and challenge teachers to adjust authoritarian practices and principles(Alterator & Deed, 2013). Thus, even though the traditional classroom may be a place of constrained learning, this is not necessarily the case for a modern indoor learning space.

A recent study has experimentally identified factors in the classroom design that influence students’ learning in the school(Barrett & Zhang, 2009). These authors considered multiple perspectives on learning within the school, using an architecture and design focus to identify key factors. They found that the most important level of indoor learning space design was the classroom level, since the classroom was where students spent most of their time in school. They found that the design principles that influenced student learning were “color, choice, connection, complexity, flexibility, and light”(Barrett & Zhang, 2009). These elements reflected design principles of naturalness, individualization, and appropriate level of stimulation. Light included both natural light and appropriate levels of natural lighting, while choice included good quality furniture and equipment and clear views from the windows. Flexibility includes

interesting, ergonomic furnishings and multiple zones, while connections included wide corridors and clear way-finding. Complexity included larger buildings, along with relatively simple classroom environments. Colors should be bright, although whether warm or cool depended on the age of the children (with younger children preferring cool colors)(Barrett & Zhang, 2009). Thus, this study provided clear evidence for how classrooms should be designed to maximize the learning experience. Other authors have pointed out the importance of features like Internet connectivity and other integrated classroom technologies and the provision of space for age-appropriate activities(Thom, 2012; Watson, 2013). These observations tend to go along with Weinstein's (1981) assertion that no single classroom setting is appropriate for all learning situations. Extending this principle of customization is the outdoor learning space, which brings children outside the classroom.

2.2.2 Outdoor Learning Spaces

A second type of learning space is the outdoor learning space, which refers to learning spaces that are outside the bounds of the school walls(Bilton, 2010). The concept of outdoor learning spaces was pioneered in the early 1900s by early education theorists like Maria Montessori, who included outdoor play and gardens in the structured play of her educational system, and by the Scouting movement, which emphasized outdoor experience(Joyce, 2012). Prior to this, outdoor education was primarily recreational, or in some cases did not exist at all(Joyce, 2012). Today, most schools include structured or unstructured areas that are used for play and sometimes for instruction, including playgrounds, gardens, playing fields, or similar areas, although the size of these spaces varies(Bilton, 2010). Other schools may include formal outdoor learning areas that are used for study of subjects such as mathematics or science(Legaspi & Straits, 2011; Maynard & Waters, 2007).

Outdoor learning spaces may be adjacent to the school, or they may be off-site (Joyce, 2012). Innovations such as the Scandinavian Forest Schools approach, which is widely used in the UK, often take children away from the school – for example to a nearby

nature reserve or other environment – to experience outdoor learning in a more realistic setting than the spaces provided within schools(Joyce, 2012). In later years, children may engage in programs that offer overnight trips or even longer trips as a way to learn about nature and the environment, although these programs vary widely depending on the country(Joyce, 2012).

Outdoor learning spaces are common settings for informal learning in areas like social development and physical development, as they are often used for free play ('recess') periods and for organized games and physical education(Joyce, 2012). Outdoor learning spaces can also be used for formal lessons, depending on what is available to the school and the age of the children(Bilton, 2010; Joyce, 2012). For example, outdoor spaces offer students the opportunity to observe nature, to learn about the environment and their local ecosystem, and to conduct scientific observations and experiments(Bilton, 2010; Joyce, 2012). In some outdoor learning spaces, gardens and other modes of direct interaction with nature are encouraged, while in others children may learn skills such as bush craft(Joyce, 2012). However, as Joyce (2012) noted, what is available to children has varied widely over time and also depends on the environment of the school). Outdoor learning spaces can include a mixture of natural environments (especially for Forest School and similar activities) and architectural elements such as play areas, sporting equipment, shelters, and other elements(Rafferty, 2012).

Outdoor learning spaces offer many benefits to learners, including the experience of being challenged and being in a novel environment(Preston, 2014). These spaces also offer children the opportunity for self-directed discovery driven by their own interest(Mangiante, 2009).

Because outdoor learning spaces are unpredictable and challenging, they can promote both improved social understanding and improved skills such as risk analysis(Preston, 2014). In some cases, such as school gardens, outdoor learning can promote a sense

of ownership and belonging to the school(Passy, 2014). Outdoor learning spaces can also have mental and physical health benefits for children, including social benefits, stress relief, and the benefit of regular exercise(Joyce, 2012). Rafferty's (2012) analysis of the outdoor spaces of a college campus also demonstrated that outdoor learning spaces can challenge the assumptions of the indoor classroom, especially assumptions about what kind of discourse is allowed and how interactions between students and teachers is to be structured. Thus, outdoor learning spaces can be very beneficial for students in several ways.

Despite the importance of outdoor learning space, they are often ignored in the provision of schools, especially in urban schools where land is at a premium and there may be no easy access to areas such as parks(Cooper, 2015). Even though formal recommendations include about 75 square feet (7 square meters) of structured and unstructured outdoor space for each child, these recommendations are often not met(Cooper, 2015). This is particularly problematic for urban children, who may not have easy access to nature and the outdoors(Cooper, 2015). Furthermore, even if these areas are available, teachers may not be able to make good use of them because they lack training in outdoor education, leading them to miss critical teaching opportunities(Maynard & Waters, 2007).

Outdoor learning spaces, as has been shown, are crucial for informal and social learning and can provide a critical connection to the environment. However, these spaces are not available to all schools, and may be limited in their design. Therefore, informal learning spaces provide another way to provide the social and interactive component of learning even if outdoor learning spaces are limited.

2.2.3 Informal Learning Space

The third category of learning space is the informal learning space. Informal learning space can be considered as 'the space between' the formal spaces of learning, either indoor or outdoor(Nair & Gehling, 2010). The notion of informal learning was proposed

by Coffield (2000), who argued that “if all learning were to be represented by an iceberg, then the section above the surface of the water would be sufficient to cover formal learning, but the submerged two thirds of the structure would be needed to convey the much greater importance of informal learning”(Coffield, 2000). Informal learning is a social learning perspective, and emphasizes social interaction as the basis for learning(Coffield, 2000). Deriving an exact definition of informal learning is a problem because of the breadth of experiences that lead to learning, but which do not take place in a classroom(Coffield, 2000). Questions such as whether learning is structured and prescribed by formal curricula and whether it ultimately leads to some form of qualification or certification is one way to identify informal learning(Coffield, 2000). A more formal definition is that it is “the unplanned learning that goes on in daily life and can be received from daily experience, such as from family, friends, peer groups, the media, and other influences in a person’s environment”(Bîrzéa, 2000).

Informal learning does not predominantly take place in the classroom or the organized outdoor learning environment (although these can also be places of interaction and social learning)(Bîrzéa, 2000). Instead, informal learning spaces are those within the school but outside the classroom, for example the hallways, cafeteria, lounges and other social spaces, gym areas, and libraries and media rooms(Skiba, 2006). These informal learning spaces provide different affordances to students than the classroom does, as it is not structured and organized in a way that promotes the formal learning style of the classroom(Dabbagh & Kitsantas, 2012). For example, these informal learning spaces can provide opportunities for informal social interaction or group learning activities, which are self-directed by the participants rather than by the teacher(Nair & Gehling, 2010). Nair and Gehling (2010) noted that informal learning spaces have characteristics of moving spaces (hallways) and meeting spaces (libraries and cafeterias), which enable different types of social interaction. Although previous authors have mainly studied informal learning spaces as an indoor learning space(Bîrzéa, 2000; Coffield, 2000; Nair & Gehling, 2010). There are also outdoor informal learning spaces such as playgrounds that can be beneficial to students(A.

Taylor, 2009). Thus, informal learning spaces can include both indoor and outdoor spaces.

Figure 2. 14 The Rug room of City College Norwich

Informal learning spaces can be incidental and serve other purposes in the school, like hallways, or they can be spaces that are specifically designed to meet the needs of learners(A. Taylor, 2009). One example of such a formally designed(Band, 2012). One such example is the Rug Room of City College Norwich, which was developed to provide students with autism and Asperger's syndrome with a comfortable informal learning environment. The Rug Room has multiple spaces to serve specific sensory needs and comfort needs, including spaces for social interaction, safe spaces for cooking and eating, and spaces for quiet separation. This space is designed to provide students with an environment that balances social interaction with their own physical and emotional needs, allowing them to access learning effectively(Band, 2012). Thus, even if the intention of the space is not to create a formal learning environment, there is still the opportunity to improve conditions for learning.

In some cases, informal learning spaces do not emerge from school design, but from student repurposing of social spaces for learning(Hunter & Cox, 2104). For example, it is common for students in high school or university to study either independently or in groups in social settings such as coffee shops, which facilitate learning and social interaction without the formal rules that come with spaces such as libraries(Hunter & Cox, 2104). This trend can be integrated into on-campus facilities for younger learners; for example, by integrating cafes and active social spaces into library settings(Bodolay, Kruse, Frye, & Luke, 2016). This type of re-imagining of the library space moves it from a formal learning space, bound by rules about conduct and access to library resources, toward an informal learning space that students can use flexibly and openly(Bodolay et al., 2016).

One of the questions that has not been fully answered is how informal learning spaces should be designed and what elements they should contain to facilitate social learning. Authors have addressed the idea of adding informal spaces to formal learning environments like libraries(Bodolay et al., 2016). However, in terms of understanding exactly how such space should be designated or arranged, most of the evidence comes from case studies of successful informal spaces, and there is not much consideration of how these spaces emerged. In part, this is common for all the literature on learning spaces, in which the architecture of the space is taken as fixed (although the fittings such as furniture may be moved)(A. Taylor, 2009). Thus, even though informal learning spaces have been considered for a while, there are still questions about the most effective architectural design and arrangement.

2.2.4 Critiques of the learning space literature and research gap

There are some problems of the learning space literature that need to be considered. The literature is sporadic and does not focus on longitudinal research, instead relying on cross-sectional case studies and other non-systematic evaluations (Watson, 2013).Even in areas such as outdoor learning spaces, where there has been a lot of interest and examination, this has led to a fractured set of principles and practices

about how the learning space and pedagogies fit together. Perhaps the area that is most complicated and least well-studied is the informal learning space, which has highly disparate concepts.

While evidence that all three types of learning spaces are important, there is a particularly large gap in the research on the architectural elements of the learning space, such as stairs and terraces that could influence how children utilize space for learning. This is particularly noticeable in the area of informal learning spaces, which are often considered to be emergent from existing architectural structures rather than deliberately designed.

The hypothesis of the different aspect that make those architectural elements were selected among group of students would be the idea of outdoor space. As all the mentioned architectural elements above are stairs, terraces or circulation spaces which are all outdoor elements. The nature environment would be part of the next stage of investigation too. This aspect will be carry on to the next chapter of case studies of observation to find the answer whether this hypothesis is right or wrong.

Chapter 3
Case Studies

According to the research question, three schools are selected during the observation phase to explore students' behavior of choosing their learning space, under the same concept of life long learning. The concept of life long learning is not about the school curricular or the development of subjects that need to be adapted to world's standard, but the context of school's landscape. The layout of how each facility is placed, the architectural elements that support students learning, even the over all landscape that merging every facility to support student's need and activity, are all the factors that need to be part of the focus in choosing each case study. The context of school is slightly different as the different kinds of schools were selected. The differences of each school will help the phase of case study cover all the areas needed and help to see the various forms of space and elements that students selected to use or to form their own learning space. The three selected schools included Roong Aroon School, Satit Bilingual School of Rangsit University and International School Bangkok (ISB).

Firstly, Roong Aroon School is an alternative school and is a nontraditional curriculum establishment. The mainstream pedagogy of this school is a cultural based learning environment. Secondly, Satit Bilingual School of Rangsit University is a bilingual school with two language based learning; native/first language and an international language (Thai and English). The goal of this is to help students transit to English-only classroom as quickly as possible. The space provided is more modern than regular schools in Thailand, which influence the landscape in different ways, mostly dealing with the building itself. Nature appears as one element that clam down the area. Lastly, International School Bangkok is an international school with variety of languages and ethnicity in the school. The space is as flexible as it can be. The landscape of this school is the mixed between Thai and modern as it is an international school in Thailand.

The observation was done by interviewing staff at each school about the spaces students often use and mapping the areas on the school's plan. During the observation, the control variables are number of students and students' time spending, which will show in the behavioral mapping below. The observations were conducted throughout the school day, 8am to 3 pm, which including three breaks, two short breaks and one lunch break. To read the results, the more grey dots on the red alphabet, the more students selected to stay in that space. Black dots represent very active activities, such as playing and running. Middle gray is standard movement as such as walking. Gray is a still activity, such as reading or doing homework or studying after a lesson.

3.1Roong Aroon School

3.1.1 Roong Aroon

Figure 3. 1 The atmosphere within Roong Aroon School

Roong Aroon is a private school started in 1997. The school is composed of three independent departments, the kindergarten and the first level (K1 – K3), the primary school (P1 – P6) and the secondary and upper secondary school (M1 – M6). Based on the concept of the holistic learning process, Roong Aoong aims to provide a more natural environment and to promote creative practices that help encourage children at each age level to attain to their own learning potential.

The school is situated on fifty rais (twenty acres) of land on the outskirts of Bangkok called the Bangkhuntien district. The site is distanced from the crowded and dense city zone. The buildings are grouped by department, and are nestled in a natural environment, with surroundings that are landscaped with abundant and airy greenery, fully accessible to all students. Most of the area is developed to cater to both outdoor and indoor learning activities, supplemented by regular outside field trips. Parents, teachers and staff participate closely together to create a variety of lively and supportive activities. Believing that by maintaining a warm atmosphere among the team of teachers, workers, parents and children, the growth of a cultivated community is certain to be sustained.

Ways of Learning at Roong Aroon

Associate Professor Prapapat Niyom, Roong Aroon School founder stated to the Roong Aroon teachers in 2014 that learning by solving problems with wisdom, gaining value and ideals. “Nowadays, an education that only teaches children to read and write, and then pass tests is not enough. Education must teach children to manage knowledge, see connection of causes-effects, then realize their roles and know how to acquire and apply knowledge. The role of real education is to build up social ideals for the members of the society to know what it should be and what they should do. The roles of teachers must change. Teachers are not teachers but creators of social ideals for students who are growing up to be a new generation with a social conscience.” Project-based learning is a theme of student’s learning. It motivates inquiry mind staring with the problem that leads to find out or the way to some solutions. Students will have hands-on experiences to search for information, knowledge needed for the issues from the real context from the community or in that area to know its’causes and effect of the problems. Students then participate in the steps of solution. This way of learning will help students gain society responsibility in our student’s mind. Moreover, they participate in cooperation with related public, private and independent organizations in order to create joint learning

network. Accordingly, project-based learning approach aimed to cultivate their social awareness and become a socially responsible generation.

Vision

1. Bodhisatta; Beliefs in human's ability to develop themselves and enlighten by wisdom.

2. Human life is a learning process; The processes which help develop our behaviors, consciousness and wisdom, the three fold learning.

3. Holistic Education; The integration of both external (sciences) and internal (life) factors is a natural learning process for human.

4. Kalyanamitta; The learning culture is the basis of a harmonious society.

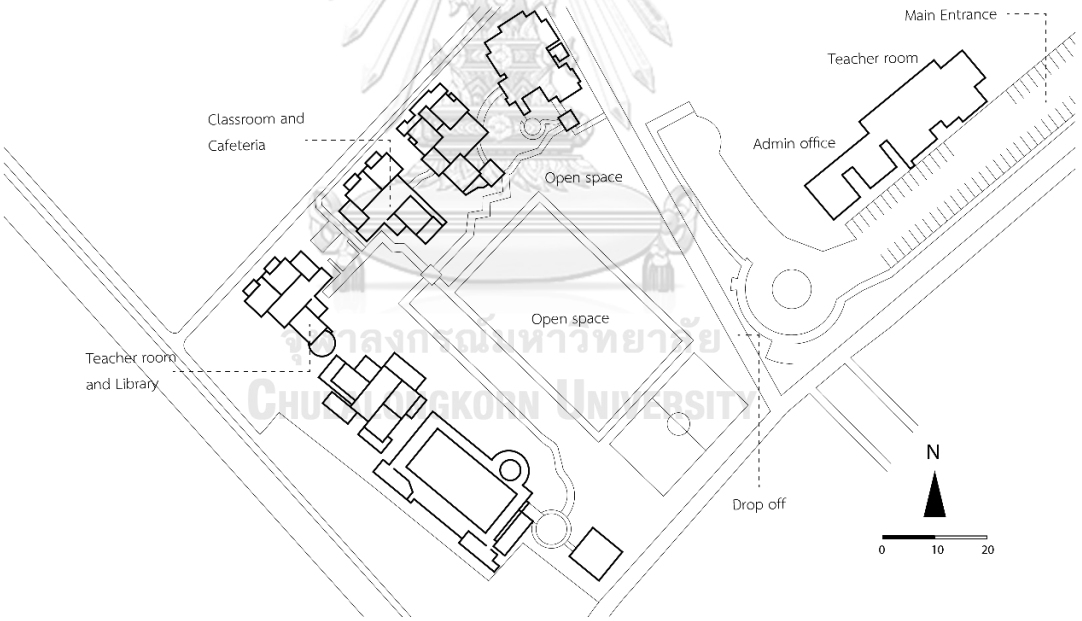


Figure 3. 2 Plan of Roong Aroon School, showing the layout

The site of school is arranged with facilities in separate clusters in the form of Thai houses. Classrooms and the cafeteria are set in the same cluster and the center area is open field that allow students and teachers to take part in activities together. The open around the buildings allow students to enjoy a pleasant environment of trees,

gardens and small yards. Most of the circulation stairs here will face out to the center space. The library was put in the middle of four clusters with administration offices at the entrance of school along with a parking area that is convenient for parents and visitors. In order to conduct the observation of the spaces, interviewing staff is needed in order to be able to understand the space as students could not be interrupted.

Observation

From the interviewing staff, these spaces and architectural features were selected to make observations.

1.

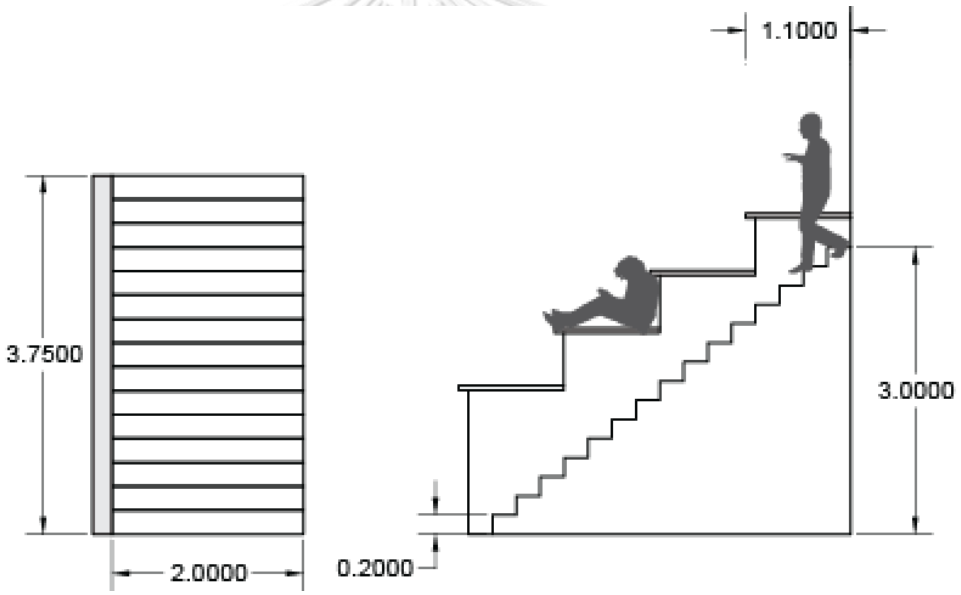


Figure 3. 3 Students sit along the stair railing

2.

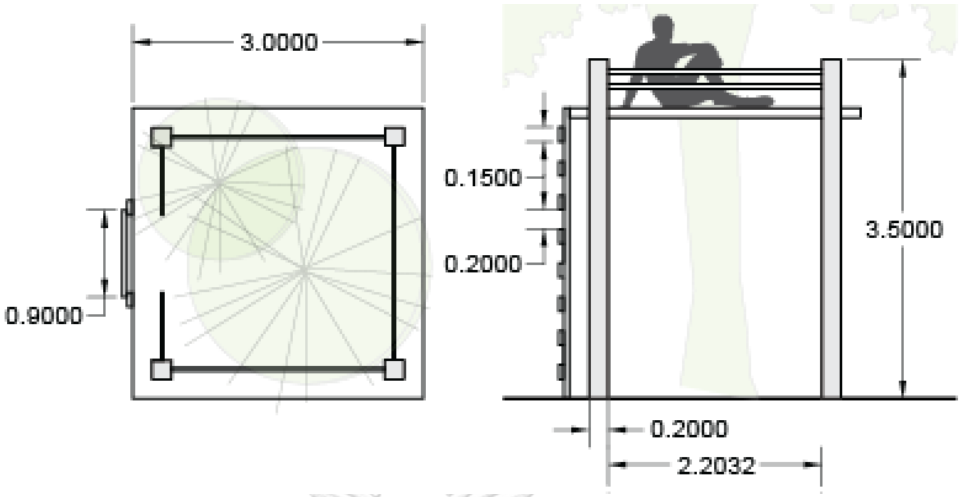


Figure 3. 4 Tress house for both play and study place

3.

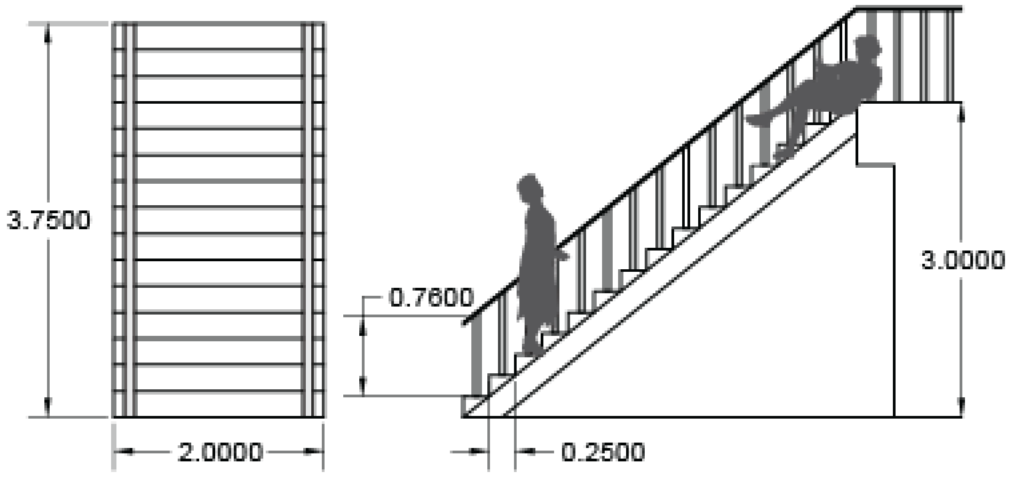


Figure 3. 5 Stairs facing out to the pond provide good view and relax atmosphere for students

4.

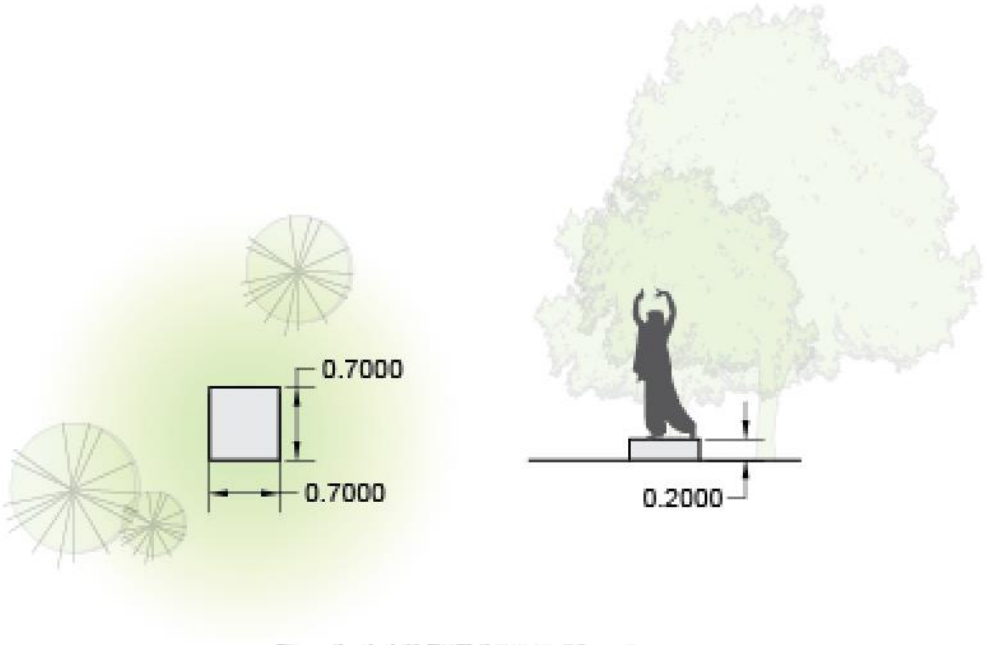


Figure 3. 6 Podium represent as a performance stage for outdoor class activity and private learning space

5.

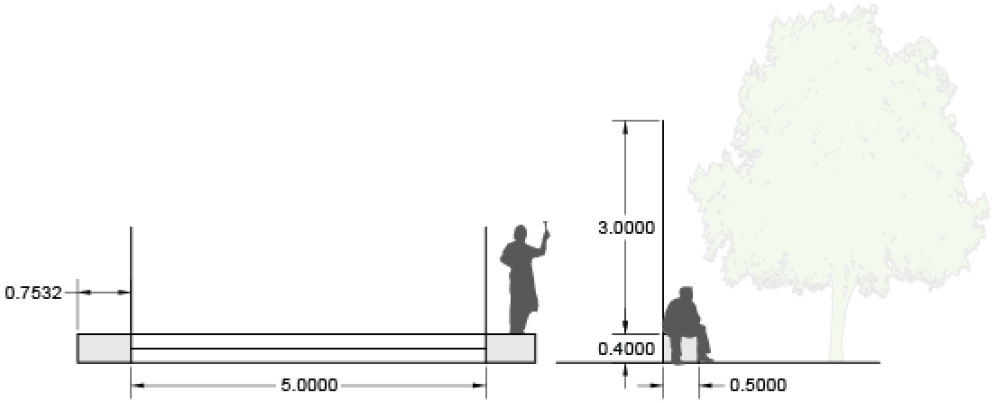


Figure 3. 7 Extended podium represent as optional elements that is designable

6.

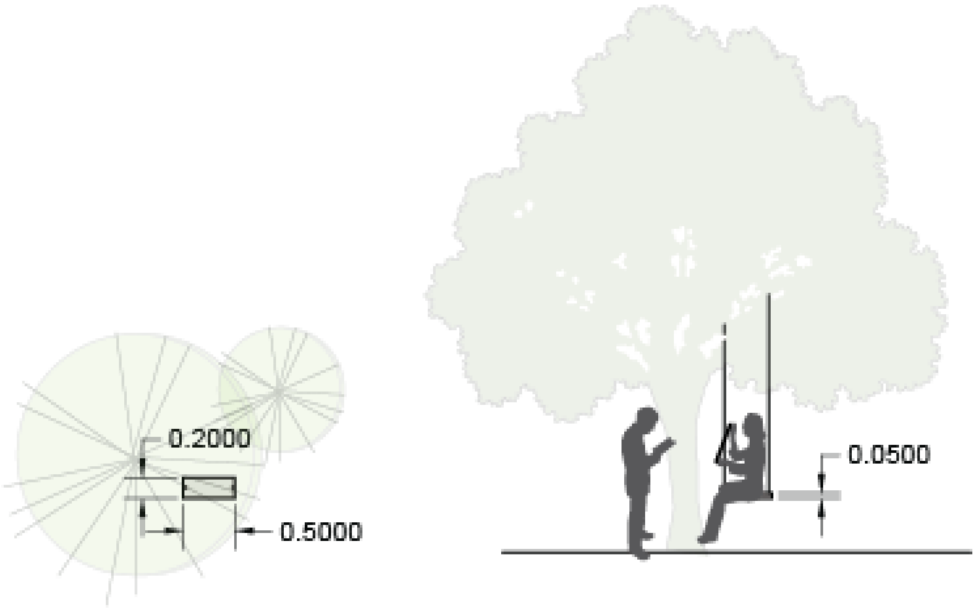


Figure 3. 8 Student's built elements as their play elements

7.

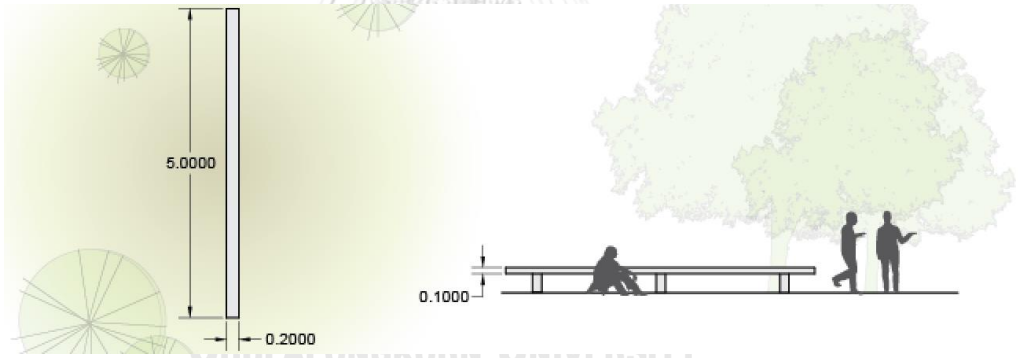


Figure 3. 9 Student's built elements as their play elements

8.

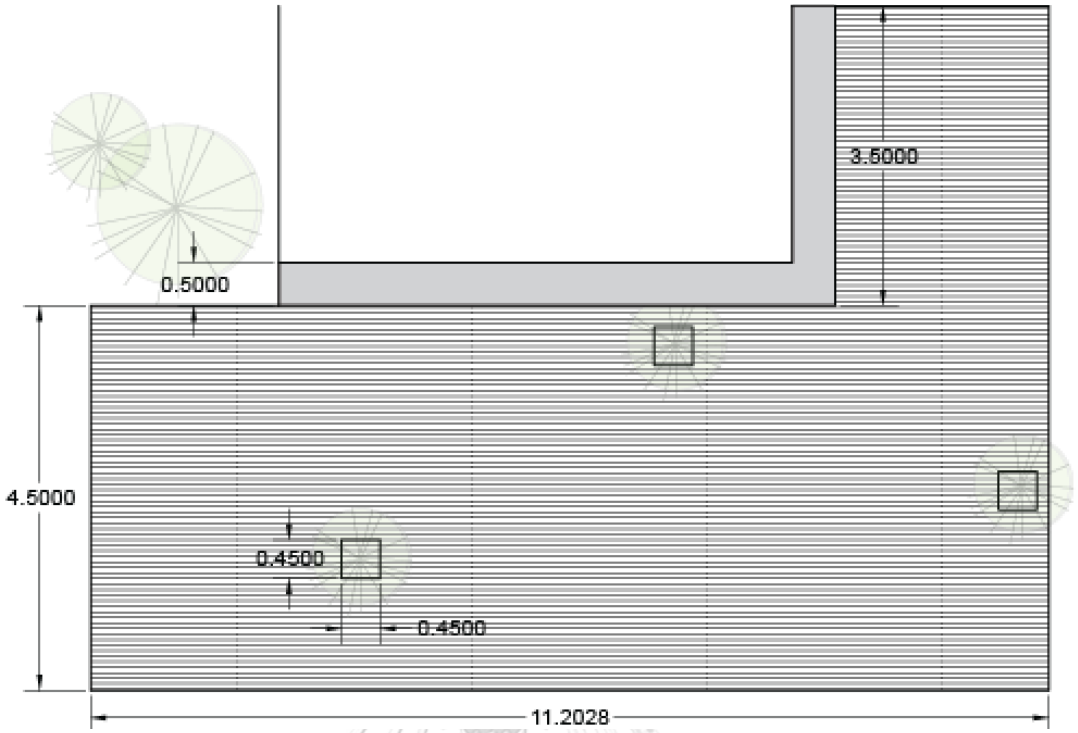
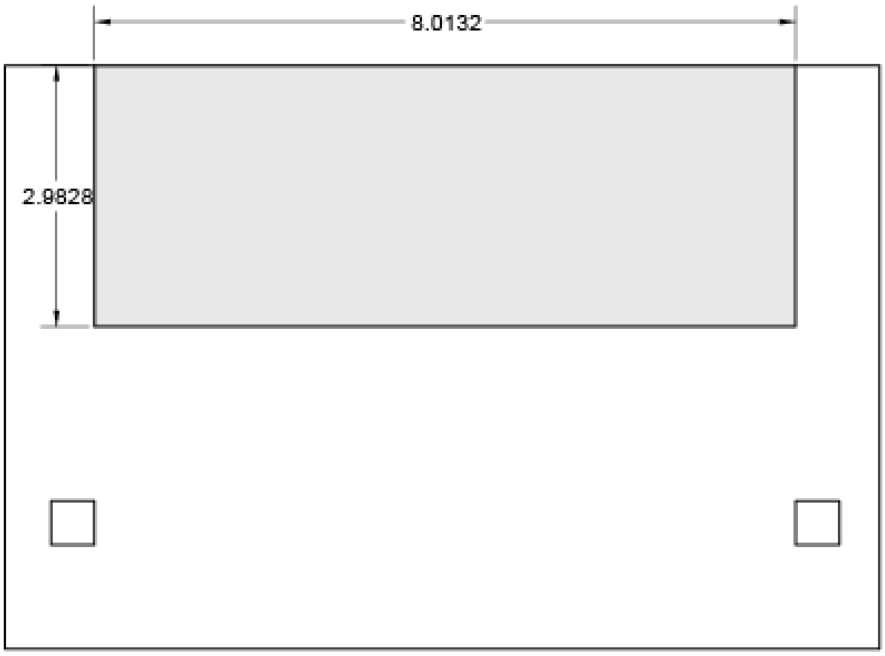


Figure 3. 10 Blur line between classroom and public space in school

9.



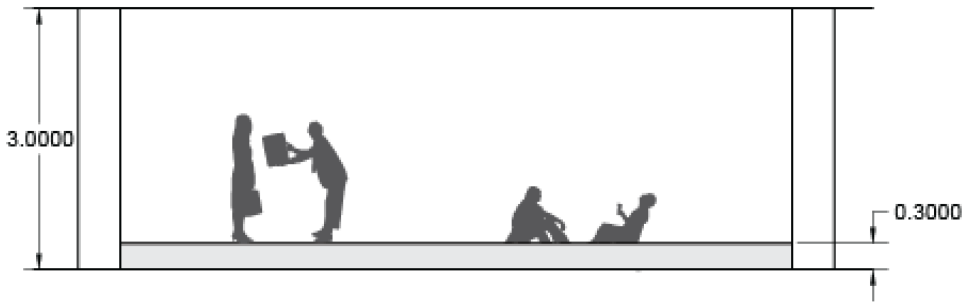


Figure 3. 11 Performance and announcement stage of school transforms into learning space

10.

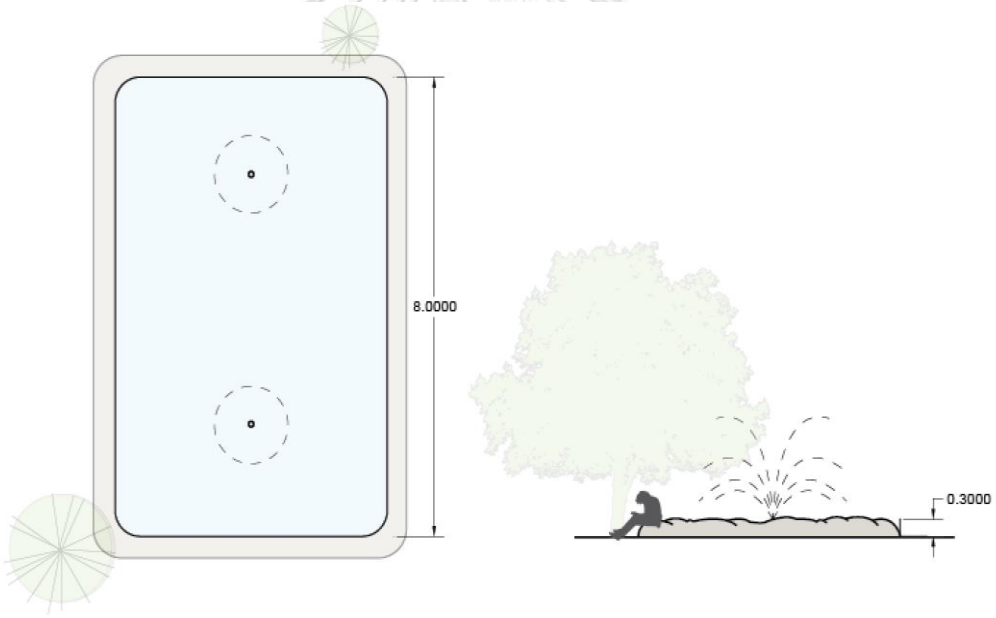


Figure 3. 12 Made pond for protecting water leak transformed to sitting space where student gather around

The elements and spaces above from number one to ten were identified from school staff's observations. However, to make sure that students really use the spaces accordingly and as indicated, it lead to examination in the next stage of analysis.

Analysis

To be able to understand the relationship between space and students, the observation can finally conclude a few factors. The figure below shows steps of how to use the method of behavioral mapping. The control variables are time and number of the students. Circles/dots are the number of the students counted. The different color dots indicate difference levels of activity, i.e .fast/high energy (running, playing), mid-energy (walking) and low-energy/stationary (sitting, reading) movement of students.

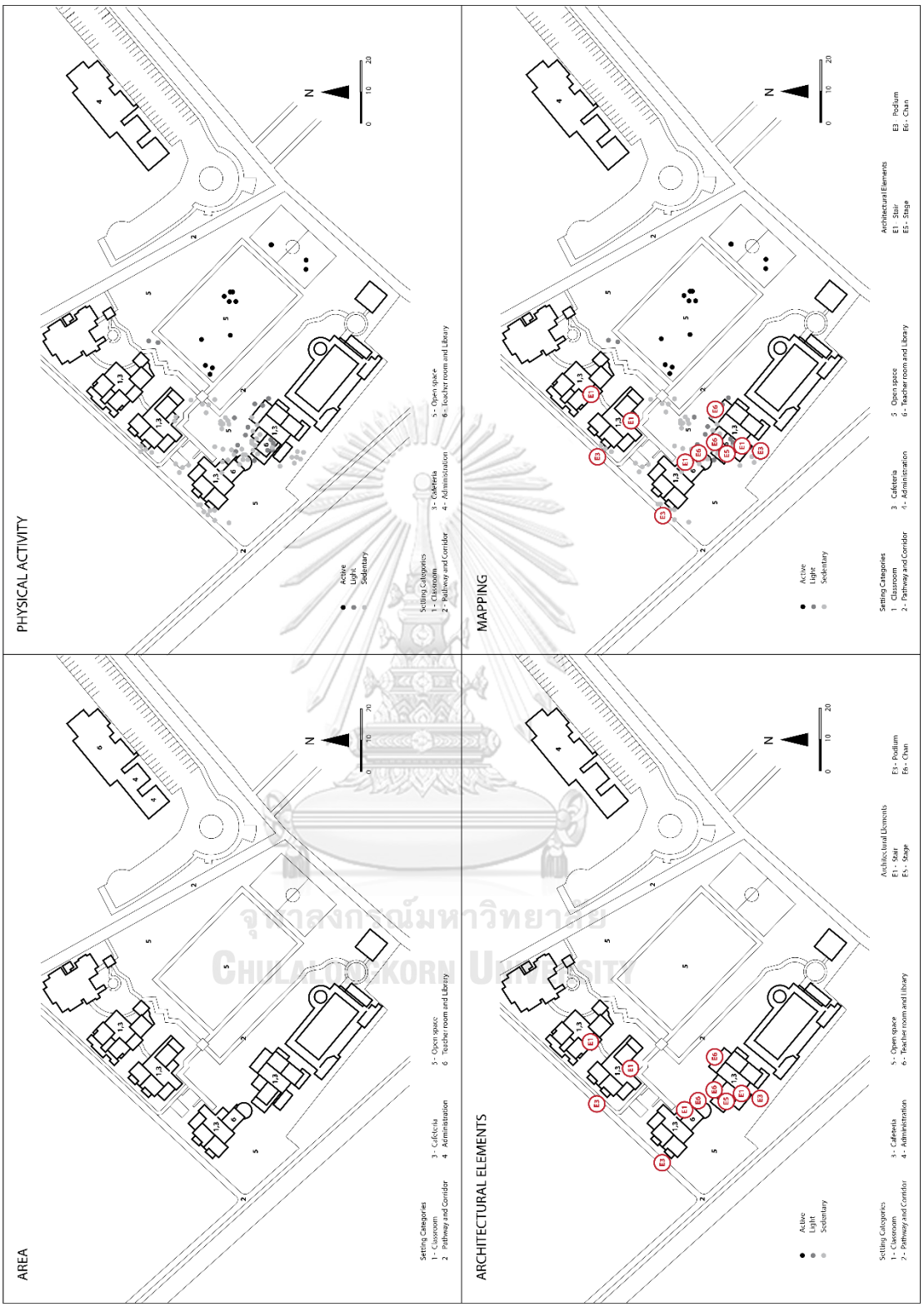


Figure 3. 13 The behavioral mapping of Roong Aroon School

Result

From the initial ten elements and spaces, students selected and used only four. The judgment of student selection is the record of time that they spend during the 3-break periods, under the condition that they need to spend time in a particular space of more than half of the break. The figure below shows students' selection after analysis.

Finding

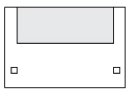
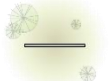
Place	No.	From Observation			Result from Observation
		Plan	Elevation	Image	
Roong Aroon School Railing space	1				✓
Tree house	2				
Outdoor stairs	3				
Podium	4				
Podium	5				✓
Chan	6				✓
Stage	7				✓
Pond	8				
Made swing	9				
Made seating	10				

Table 3. 1 The conclusion of observation emphasizes the space that was selected by students

The diagrams below show the spaces in three dimensions to help understand the elements clearly and the way students use the spaces. From the results, students always like to face out to open space while they doing an activity. It suggests they need either physical or visual interaction in the space they choose. Noticing that most of space will have at least one side that faces out to a green space like a field. The variety of activities or the transformation of elements is based on the green space that is provided. The more green space provided around the elements, the more transformation takes place. However, three sides of open space is the maximum student require as they still need a closed space on one side to make them feel secure. Four sides of open space are too exposed to the environment, resulting in students feeling less secure and losing concentration. The students group in numbers of 3-5 as it easier to work with and control the group while they are working, reading or reviewing their lessons.

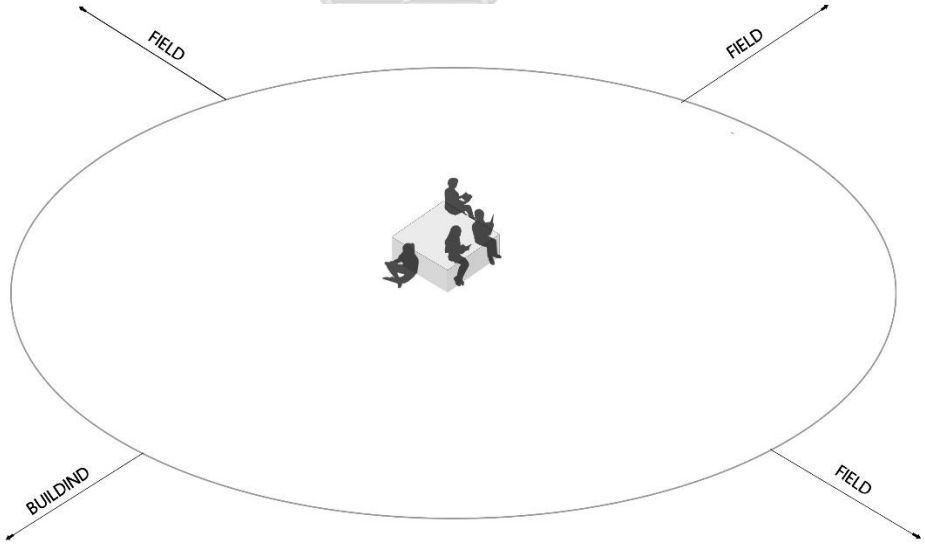


Figure 3. 14 The 3D dimension of number five

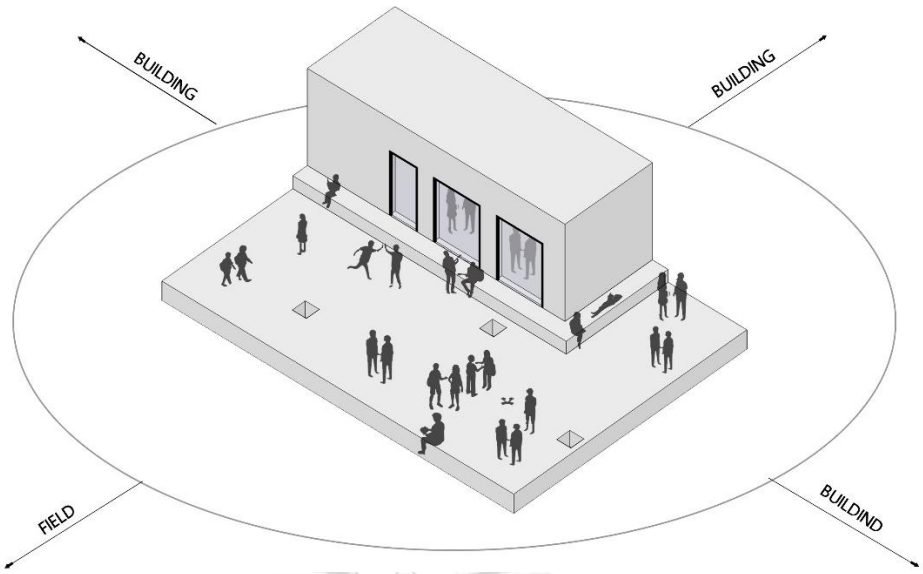


Figure 3. 15 The 3D dimension of number six

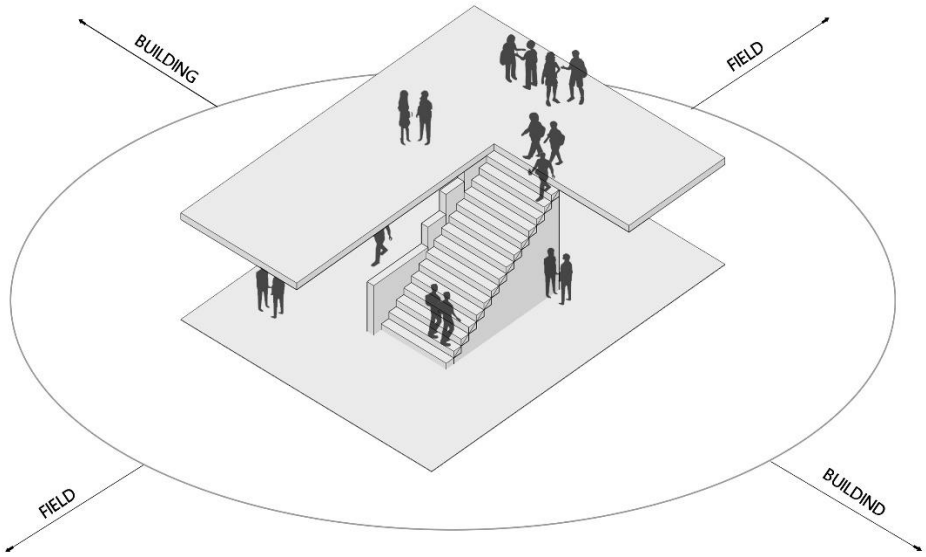


Figure 3. 16 The 3D dimension of number one

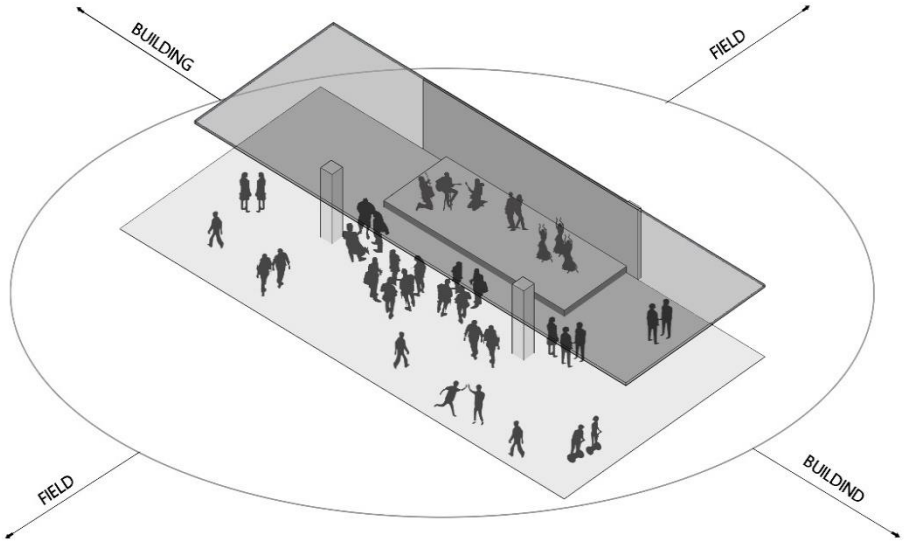


Figure 3. 17 The 3D dimension of number seven

3.1.2 Satit Bilingual School of Rangsit University

Figure 3. 18 The atmosphere within Satit Bilingual School of Rangsit University

Satit Bilingual School of Rangsit University's philosophy is "Building Leaders for Tomorrow" through out Unified Bilingual Curriculum, aims to give students the best education possible based on a two-language system, which is Thai and English. SBS combine modern architecture and state-of-the-art facilities. Learning focuses on activity based learning and child centered teaching methods. Students are taught to understand that learning does not only take place in the classroom but from experiences outside the classroom as well. The school will help develop learners with

senses of Thai ethics and appropriate social values to guide them toward a well-balanced personal and professional life. Students will also acquire two languages in a natural context to fully develop their linguistic potential and communication skills. Students will be developed as initiators, critical analysts and independent thinkers who thriven problem solving and decision-making.

Vision

SBS will be a leading player in providing world-class bilingual education in Thailand. SBS shall provide the highest quality standards in all academic areas and personal development, in particular. Mathematics, Science and Arts with ICT are a tool for learning and life-long education. Graduates will be well equipped with the knowledge, skills and attitude relevant to their career of choice and well-being.

School Concepts

1. 'A Truly Bilingual Education'

SBS aims to provide a solid bilingual educational foundation integrating Thailand's educational curriculum with international curricula. Teachers at both kindergarten and grade levels represent a balanced ratio of Thai and Native speaking English teachers. The classrooms use state of the art multimedia and employ theories of language acquisition and process-based learning.

2. 'Hands-On Learning'

SBS focuses on activity-based learning. Students are treated individually so that they can learn at their own pace. The school aims to provide 'hands-on' opportunities where students can develop skills through practical investigation and research; and having acquired these skills can help guiding their own future learning.

3. 'Technology as a Tool'

At SBS ICT is used as a tool applied throughout the fields of teaching, learning, communication and administering of the school. The students use technology as an

integrated tool throughout the curriculum to enrich and support their learning, and staff use appropriate technology as a resource for effective management of their work in support of student' education. The school provides timely and appropriate information via its website.

4. 'The Whole Student'

Students are holistically educated in all aspects of academic, social, emotional, cultural and moral values. The School aims to develop student's self-discipline and self-reliance, and an understanding of themselves in the world around them, including a strong awareness and appreciation of Thai culture by honoring and respecting family values and traditions.

5. Class Size

Classes do not exceed 30 students per class to ensure effective individual student supervision.

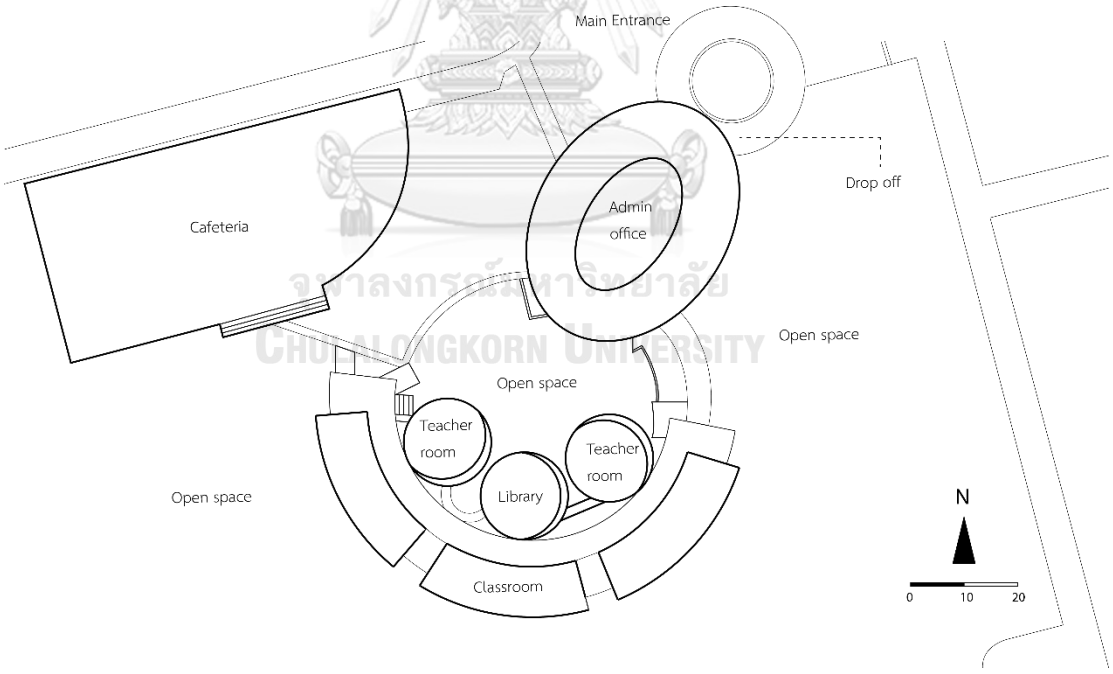


Figure 3. 19 Plan of Satit Bilingual School of Rangsit University

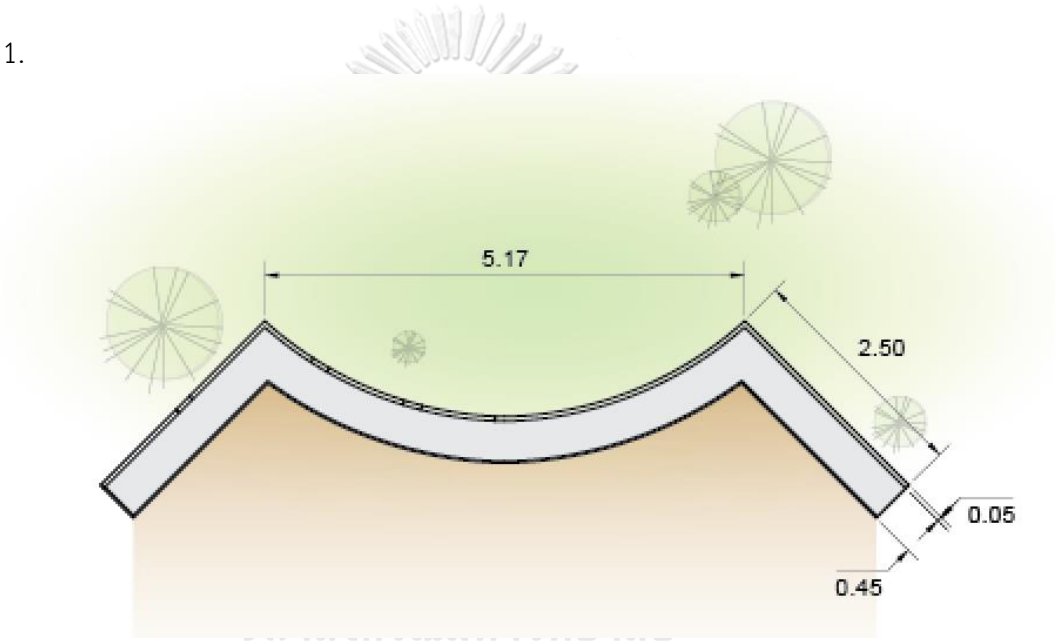
The facilities arrangement of Satit Bilingual School of Rangsit University is based on circular shaped buildings. The admin office and cafeteria in front are separated from

other class of buildings as they are public facilities. The circular theme is emphasized by arranging the classroom buildings around the outside of the circular center of the campus which is a field that acts as an activity space. The rear of every building also connects to an outdoor space so students have a close relationship with nature.

Observation

Following the interviewing of staff, these spaces and architectural features were selected to make observations.

11.



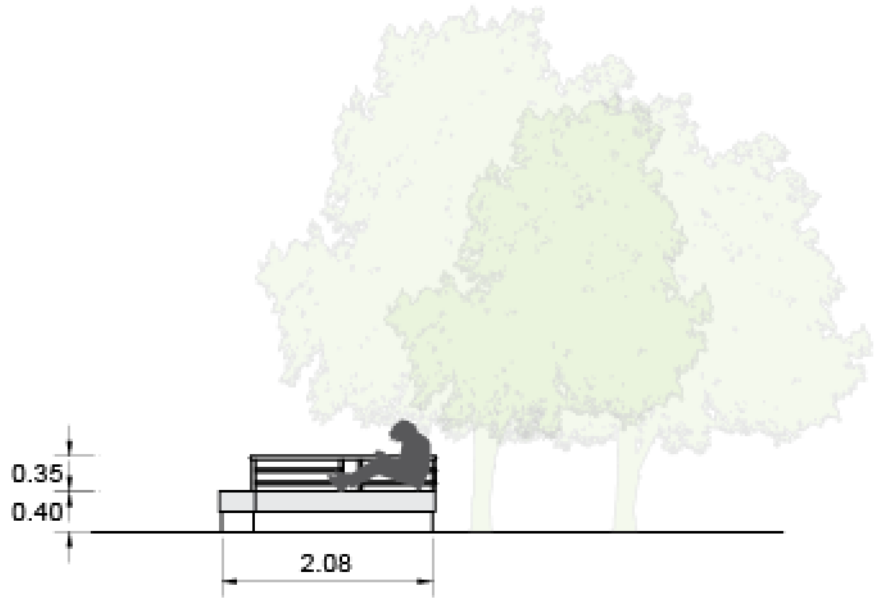


Figure 3. 20 Welcome space provided for both parents and students

12.

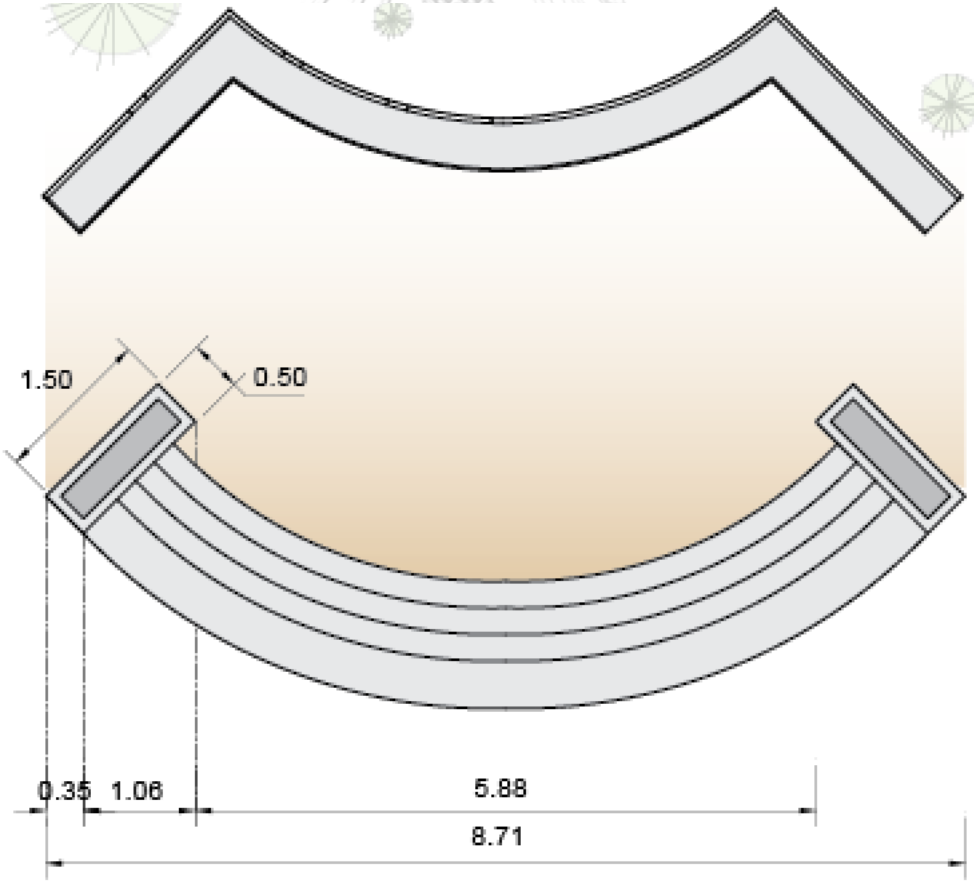


Figure 3. 21 Stairs at welcome space transformed into learning space for both classroom and break period

13.

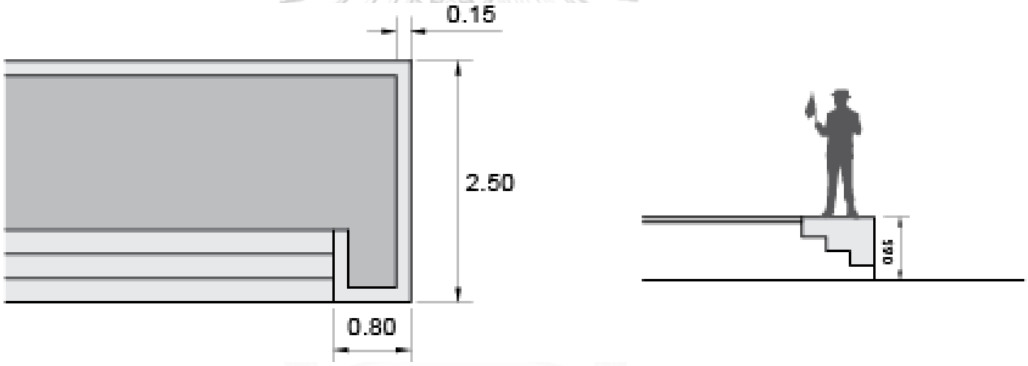


Figure 3. 22 Small-extended space transformed into mini stage of teaching and relaxing

14.

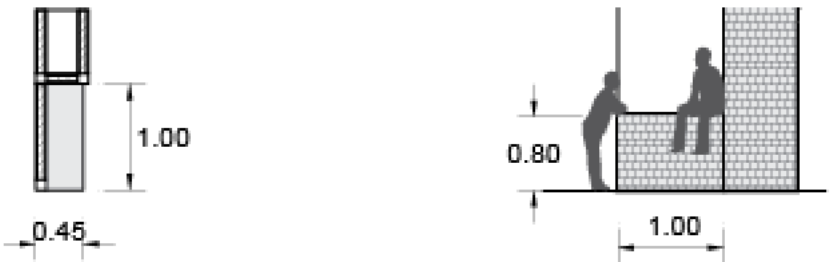


Figure 3. 23 Extended wall from stair which is part of railing transformed in a long counter space

15.

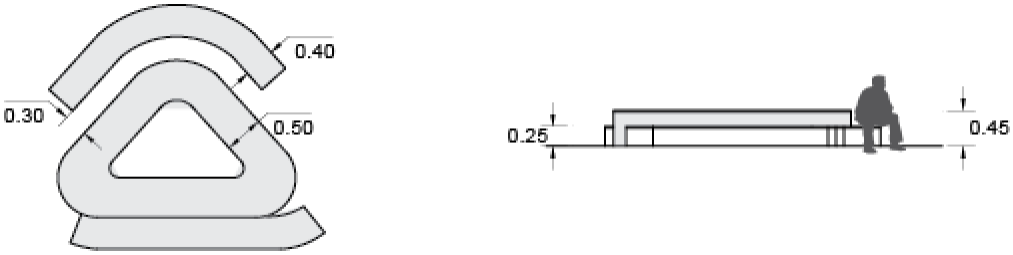


Figure 3. 24 Triangle table and chair in between building make an active space

16.

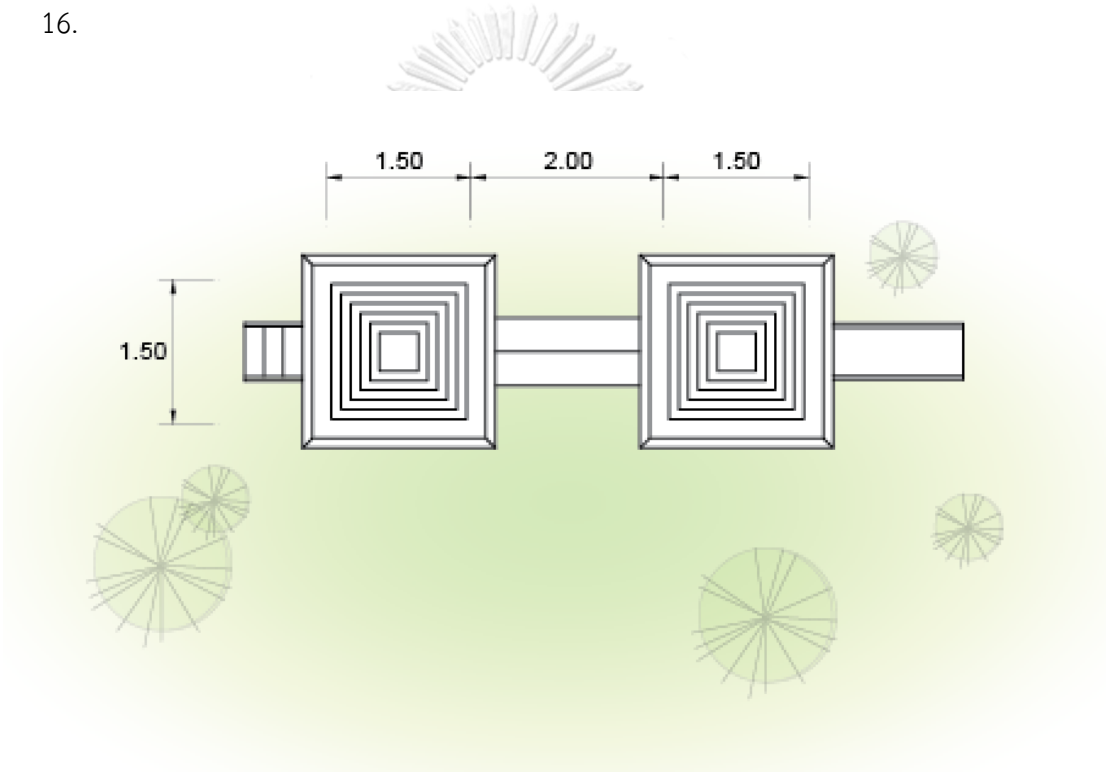
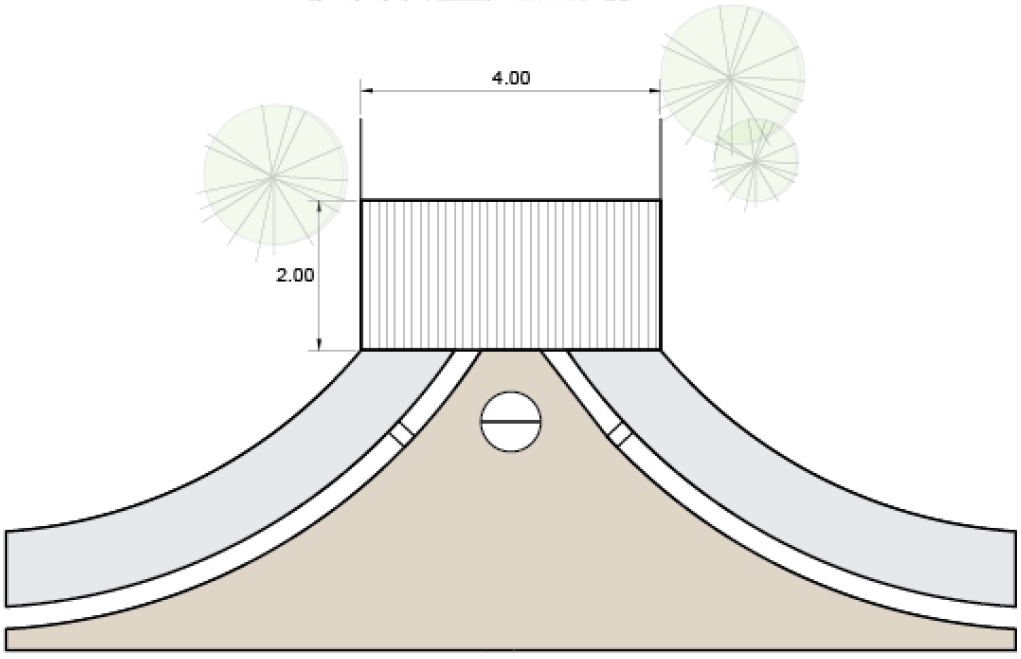


Figure 3. 25 Playground as a learning space

17.



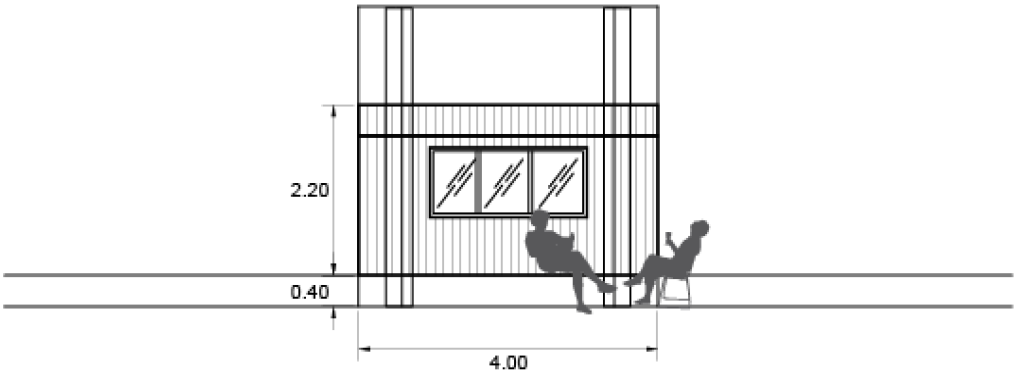
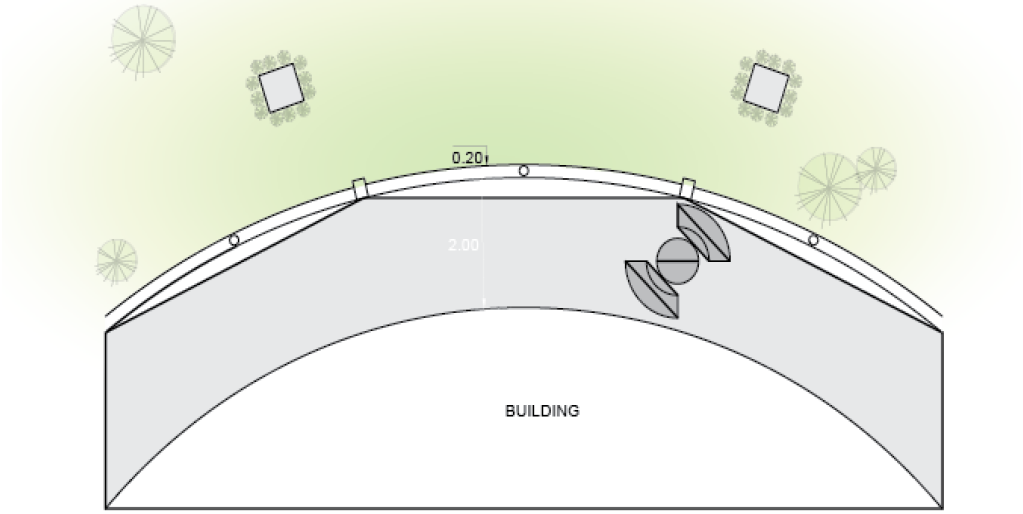


Figure 3. 26 Bridge between two buildings and corridor space create empty space in center, which provide privacy for students who need to study alone

18.



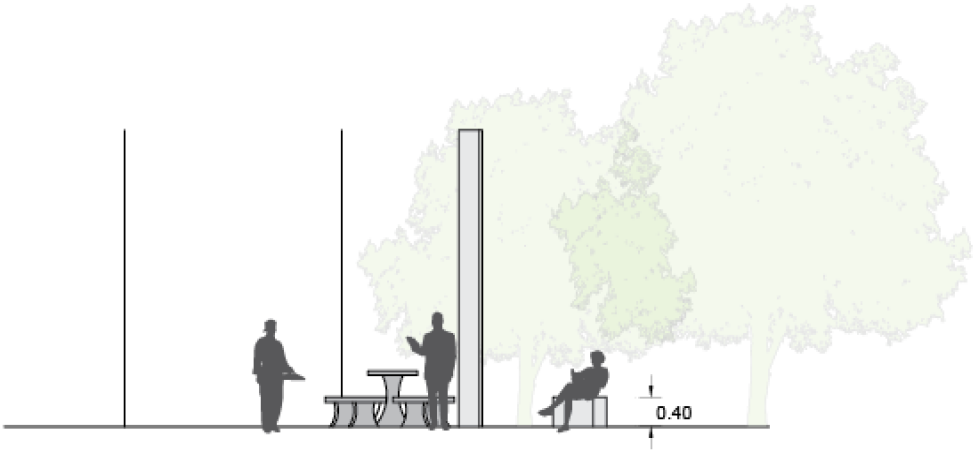
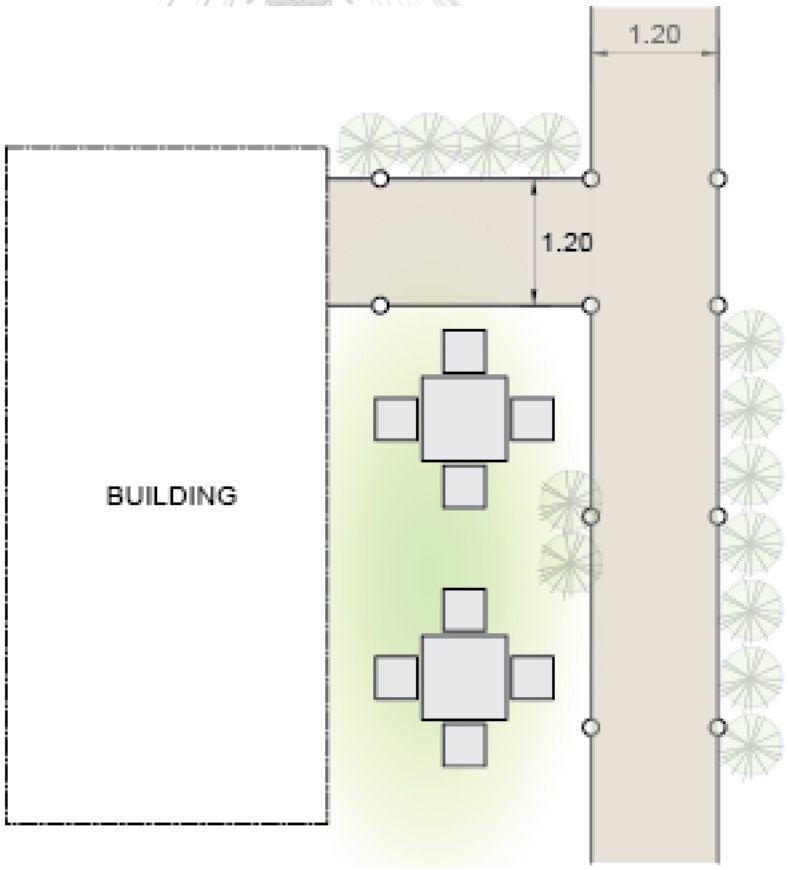


Figure 3. 27 Edge area around the building is active by students. Student will gain acoustic atmosphere in the same time with knowledge and experiences among friends while studying

19.



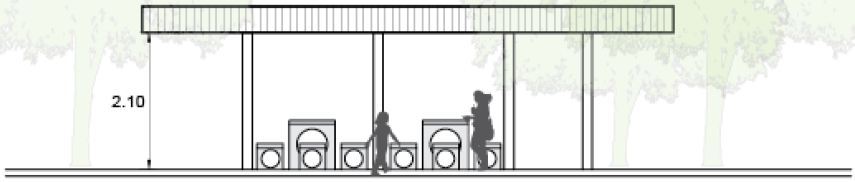
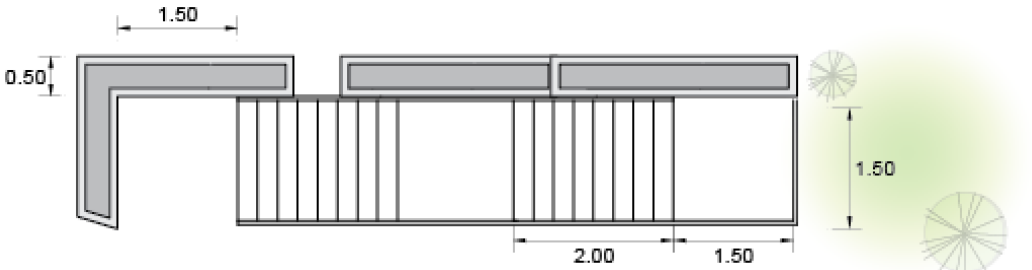


Figure 3. 28 Intersection of building created space in between

20.



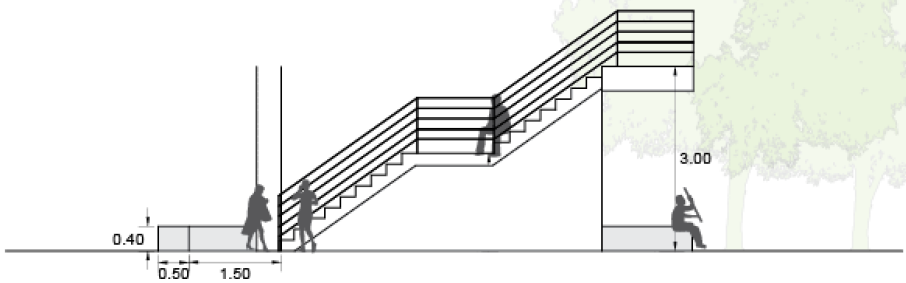


Figure 3. 29 Planting around the staircase transformed into seating with the garden view in front

21.

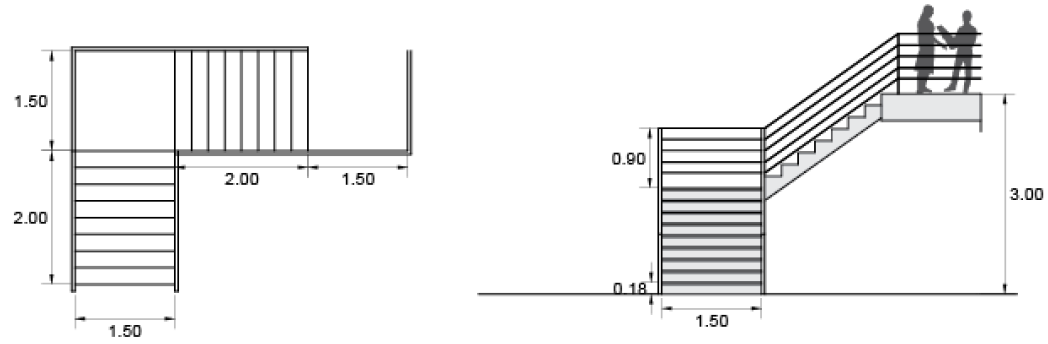


Figure 3. 30 Chan-Puk of staircase is big enough for students to hangout and enjoy the view below

22.

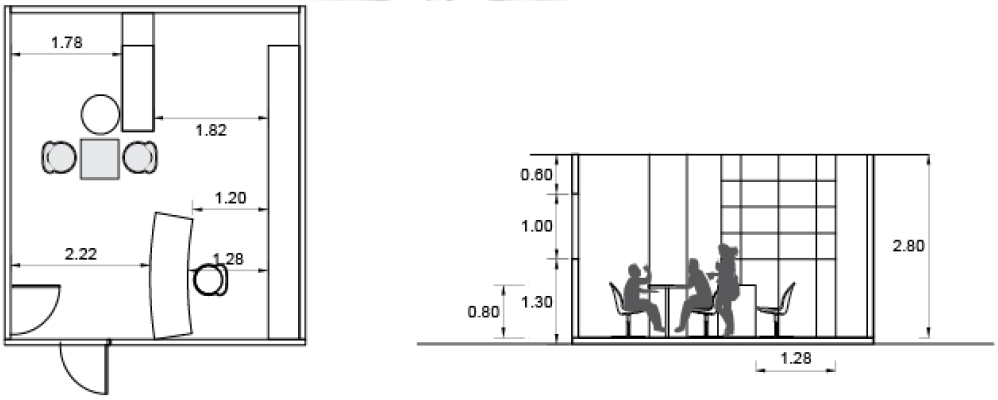


Figure 3. 31 Service room had non-serious space that students looking for during their break time

23.

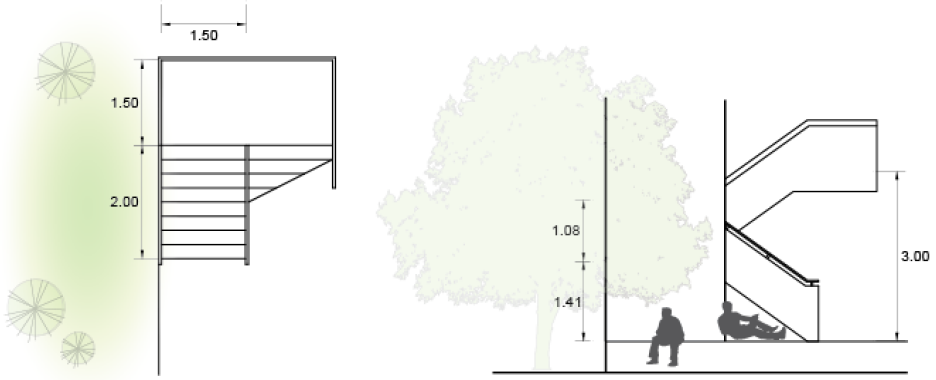
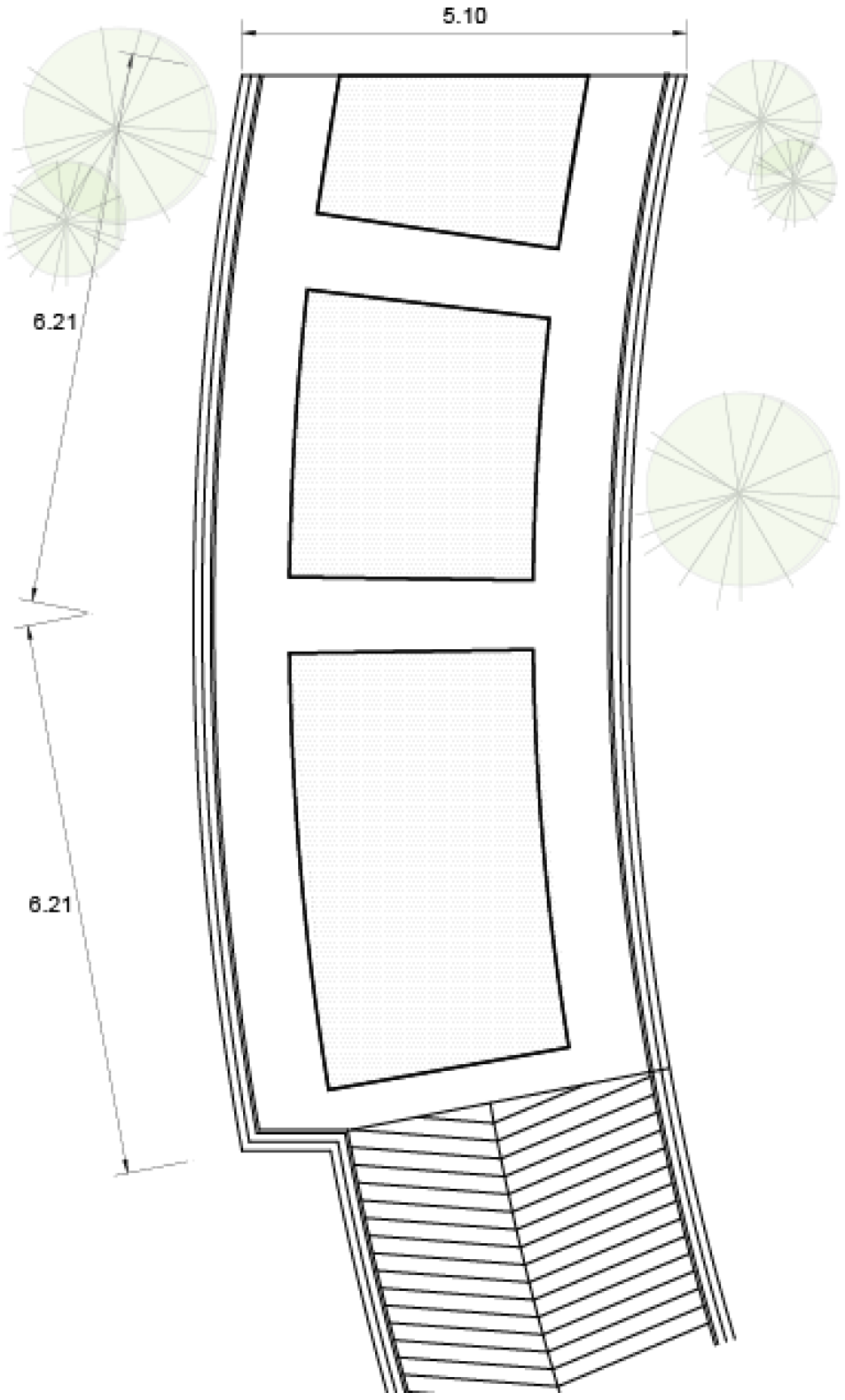


Figure 3. 32 Spaces below staircase connect to the outdoors garden, which change the purpose of the space

24.



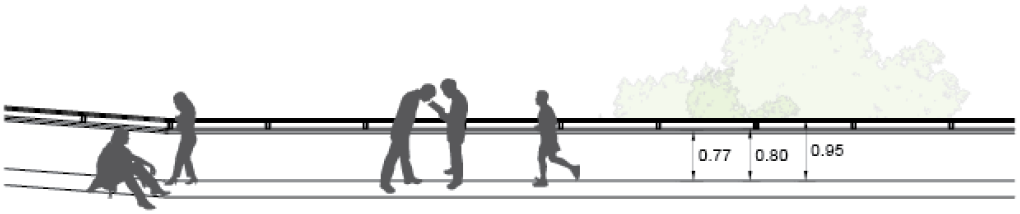


Figure 3. 33 The non-used bridge become learning and activity space for students

The elements and spaces above from number eleven to twenty-four are from staff's observations. Most of the spaces that staff talked about were part of the central circulation space. However, to ensure that students use the spaces and facilities above as described by the staff, required examination in the next stage of analysis.

Analysis

To be able to understand the relationship between space and students, the observations focus on a few factors. The figure below shows steps of how to apply the method of behavioral mapping. The control variables are time and number of students, the same as in the analysis of Roong Aroon school.

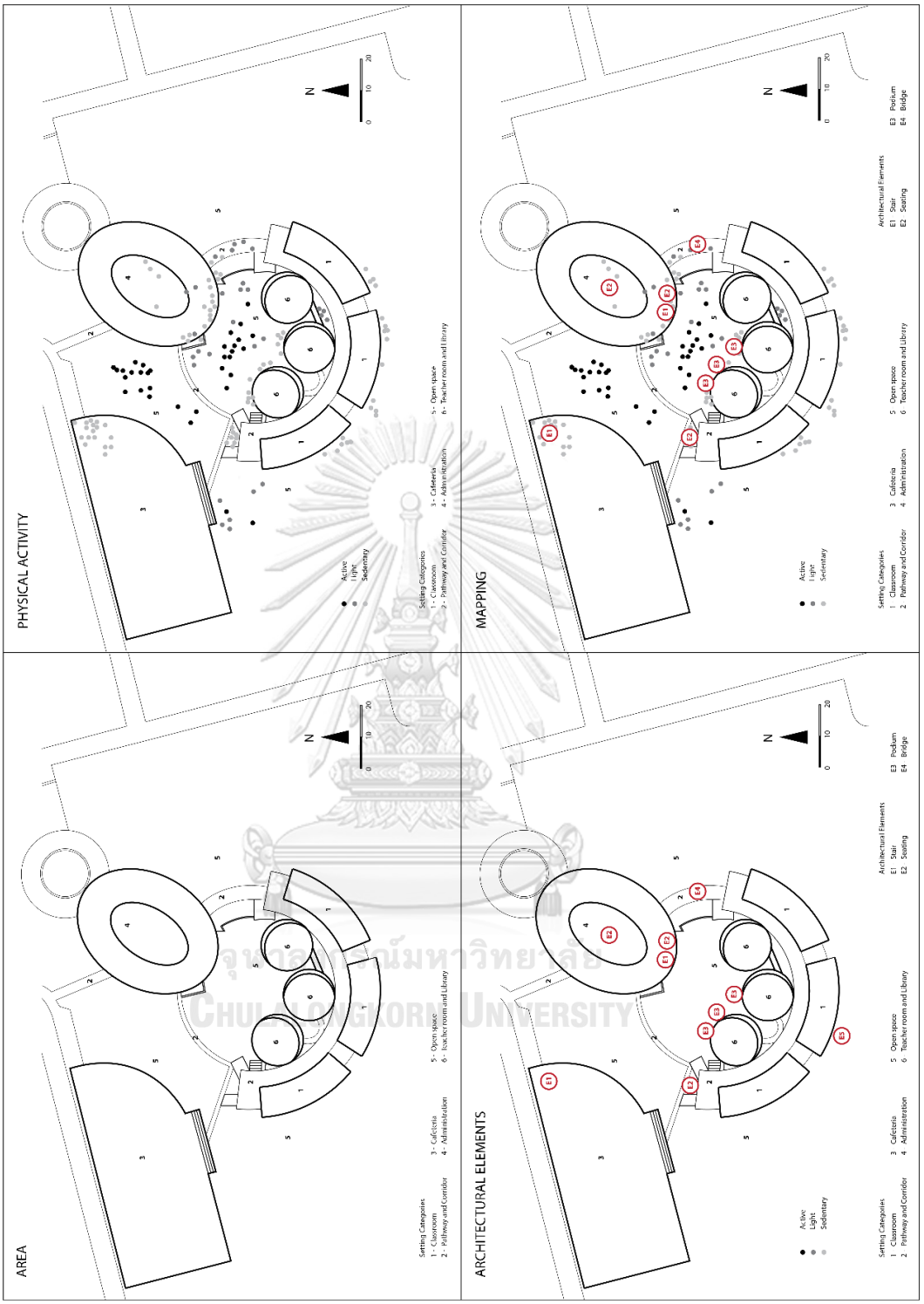


Figure 3. 34 The behavioral mapping of Satit Bilingual School of Rangsit University

Result

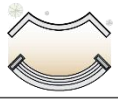
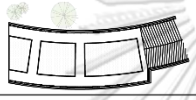
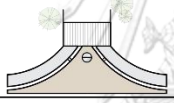
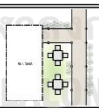
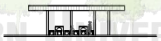
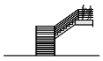
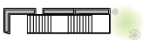
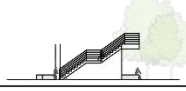
Place	No.	From Observation			Result from Observation
		Plan	Elevation	Image	
Satit Bilingual School of Rangsit University Chan	11				
Semi outdoor stairs	12				✓
Podium	13				✓
Pond	14				
Made swing	15				
Playground	16				
Space between building	17				
Semi outdoor seating	18				
Tant and bench	19				✓
Seating at intersection	20				✓
Stairs	21				
Semi outdoor stairs	22				✓
Service room	23				
Space under stairs	24				

Table 3. 2 The conclusion of observation emphasizes the space that was selected by students

Finding

The diagrams below show the students' selection of interaction spaces that connect to the nature of seating area. Seating along the edge of building or edge of central circular space is good for making students feel secure to use the space despite that being enclosed by buildings. Students count the circular space inbetween the buildigs as an open space as an area provided for them fot intereaction. Stair spaces that face out to the soccer field are also popular among students as they are open and very flexible to use for many functions. The number of student that form groups working along the stair areas are likely to be less than normal; usually 2-3 students. Stair areas are a space for students who need to concentrate and think a lot. Sometime students prefer to stay alone in the stair spaces too. They will choose to sit on different steps. Lets say that most of student who choose to sit along the stair require the higher level of privacy or boundary than other space.

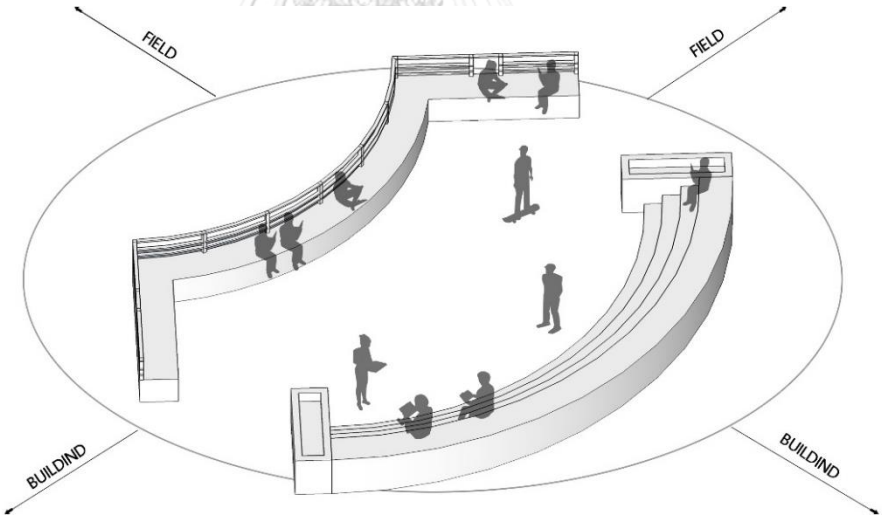


Figure 3. 35 The 3D dimension of number twelve and thirteen

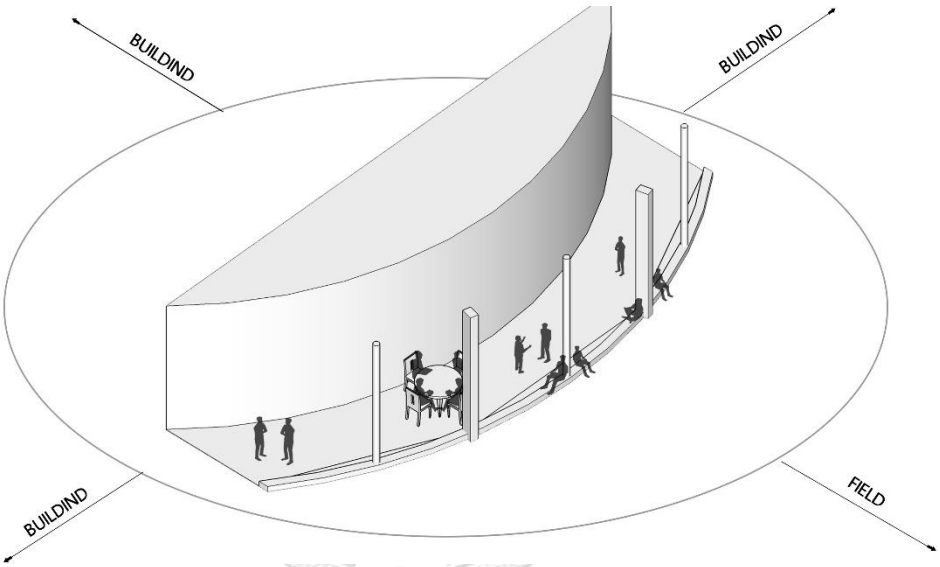


Figure 3. 36 The 3D dimension of number nineteen

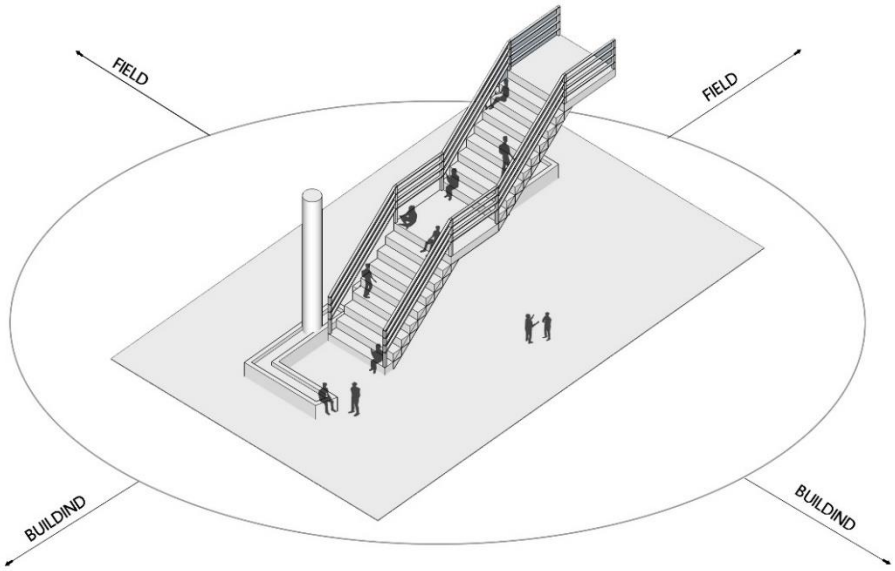


Figure 3. 37 The 3D dimension of number twenty-two

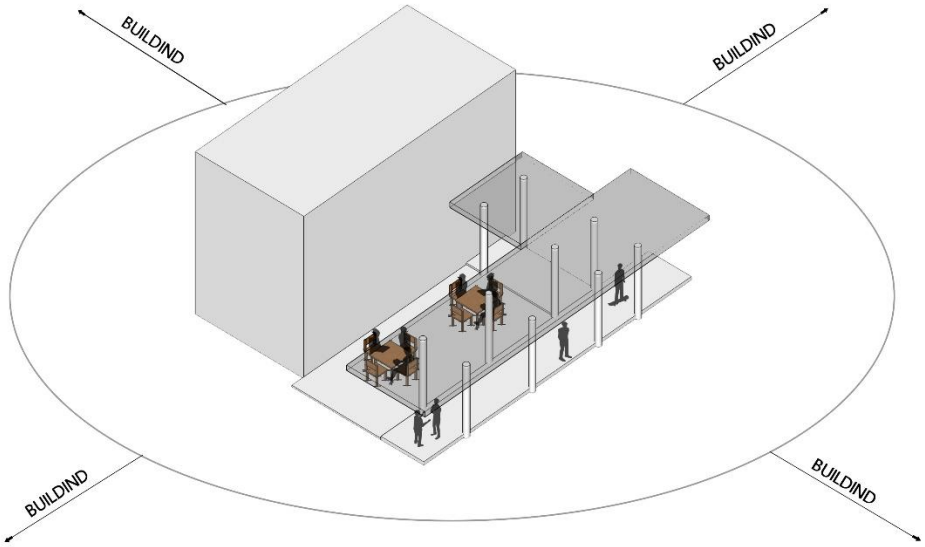


Figure 3. 38 The 3D dimension of number twenty

3.1.3 International School Bangkok (ISB)

Figure 3. 39 The stmosphere within International School Bangkok (ISB)

International School Bangkok (ISB) is one of the top international schools in Bangkok and Asia. ISB has been providing quality education since 1951 to expatriates representing more that 60 countries. Conveniently located just outside the heart of

the city on the area of 15-hectare campus, which is nestled in a beautiful community called Nichada Thani where children can walk or ride their bicycle to school along tree-lined paths. The advantage in sending children to ISB, is ISB is a learning-focused school with an educational philosophy and curriculum enriched by best practices from around the world. It offers a balanced program focusing on development of the whole student. Yet ISB also provides students with high standards of academic instruction, opportunities for service to others and a well-rounded program of activities directed toward the development of their skills, talents and self-confidence for lifelong learning. ISB prepares students to become leaders in meeting the ever-changing needs of the world and equips them with the knowledge to face challenges in a cross-cultural environment.

Mission

1. Achieve their academic potential
2. Be passionate, reflective learners
3. Become caring global citizens
4. Lead healthy, active and balances lives

Vision

Drive student to be a model of excellence in educating students for success in the world community.

ISB's Learning Definition

ISB values meaningful and transferable learning where it construct understanding by developing and applying knowledge, skills and attitudes. As learners will be able to show develop and understanding when:

1. Apply learning to new situation
2. Inquire to extend learning
3. Create solution
4. Communicate learning effectively to others
5. Make connections across learning
6. Reflect critically on learning

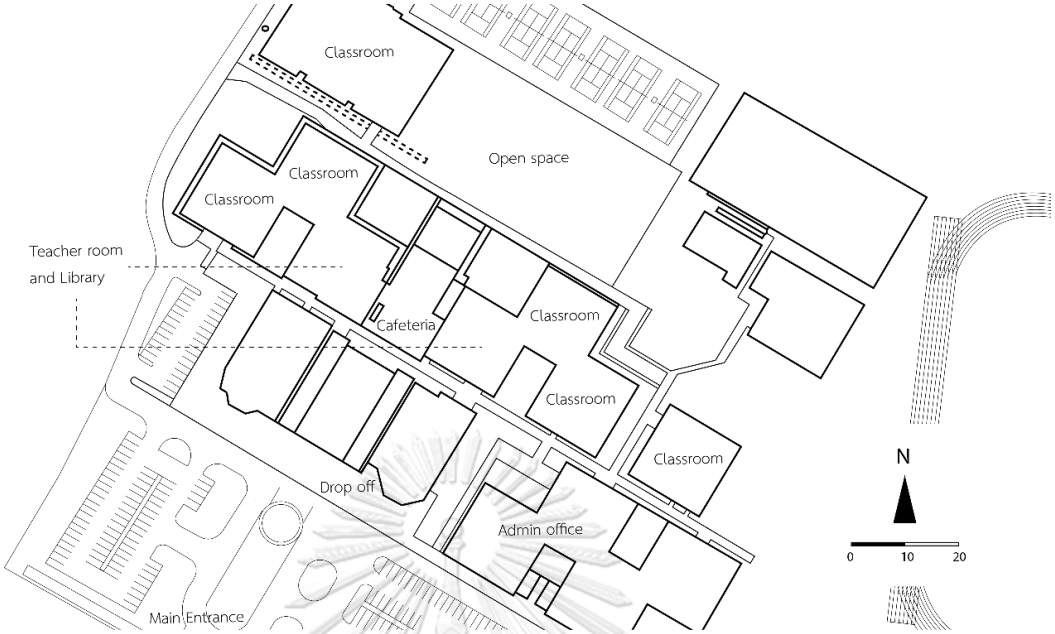


Figure 3. 40 Plan of International School Bangkok (ISB)

The layout of facilities of International School Bangkok use the idea of courtyards in the middle of learning spaces. The classrooms and activity rooms are facing into the center for students interaction. The yard in the middle could be either green or rock as long as it consists of natural elements. The cafeteria and library are at the center of the school as they are public function. The administration and meeting hall are in front to create boundary between visitors, teachers and students. At the back of classroom building are open spaces and a soccer field, which create visual interaction for the higher floor classrooms.

Observation

From the interviewing of staff, the following spaces and architectural elements were selected to make observations.

25.

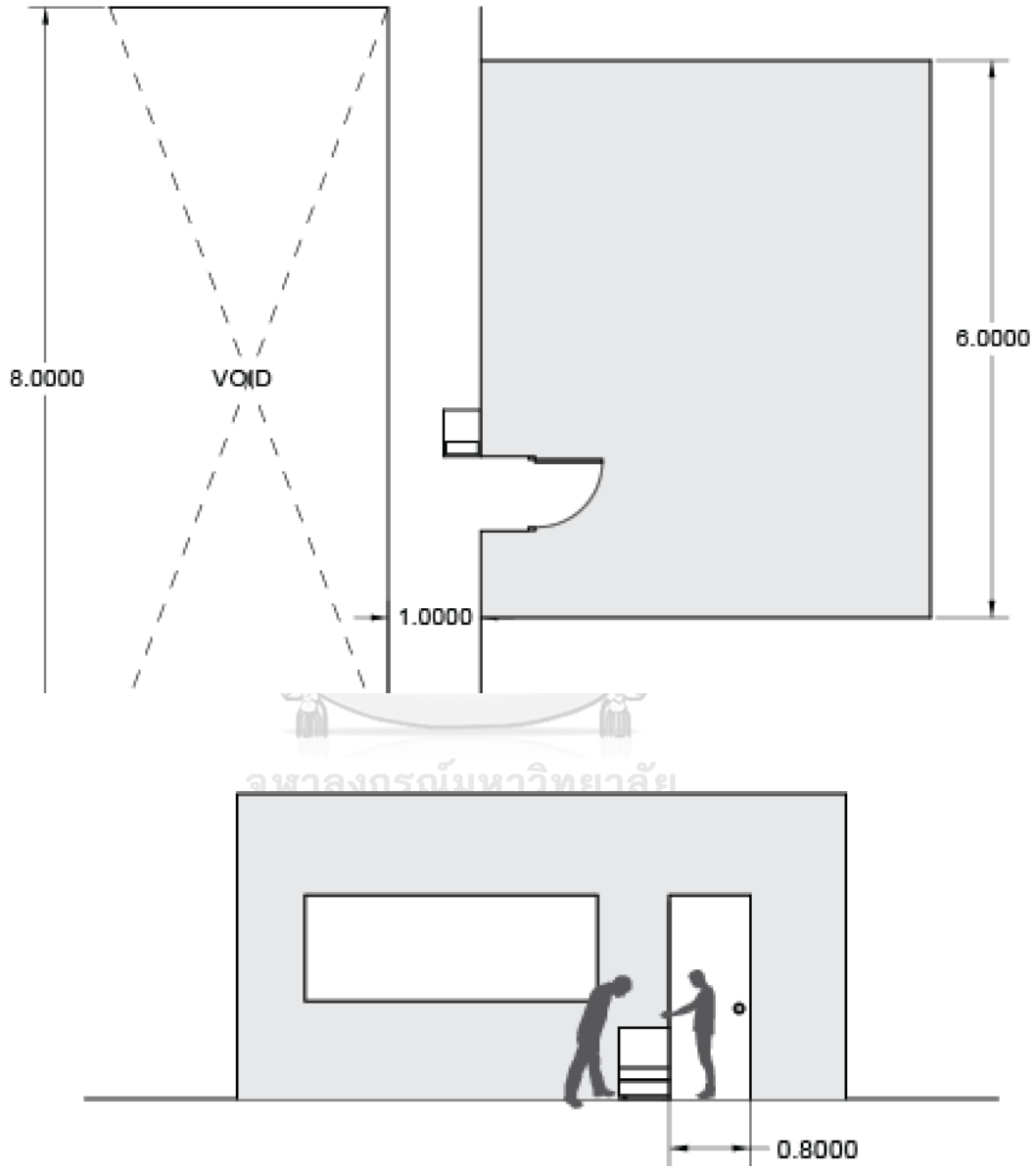


Figure 3. 41 Students show their needed of support element of learning and atmosphere

26.

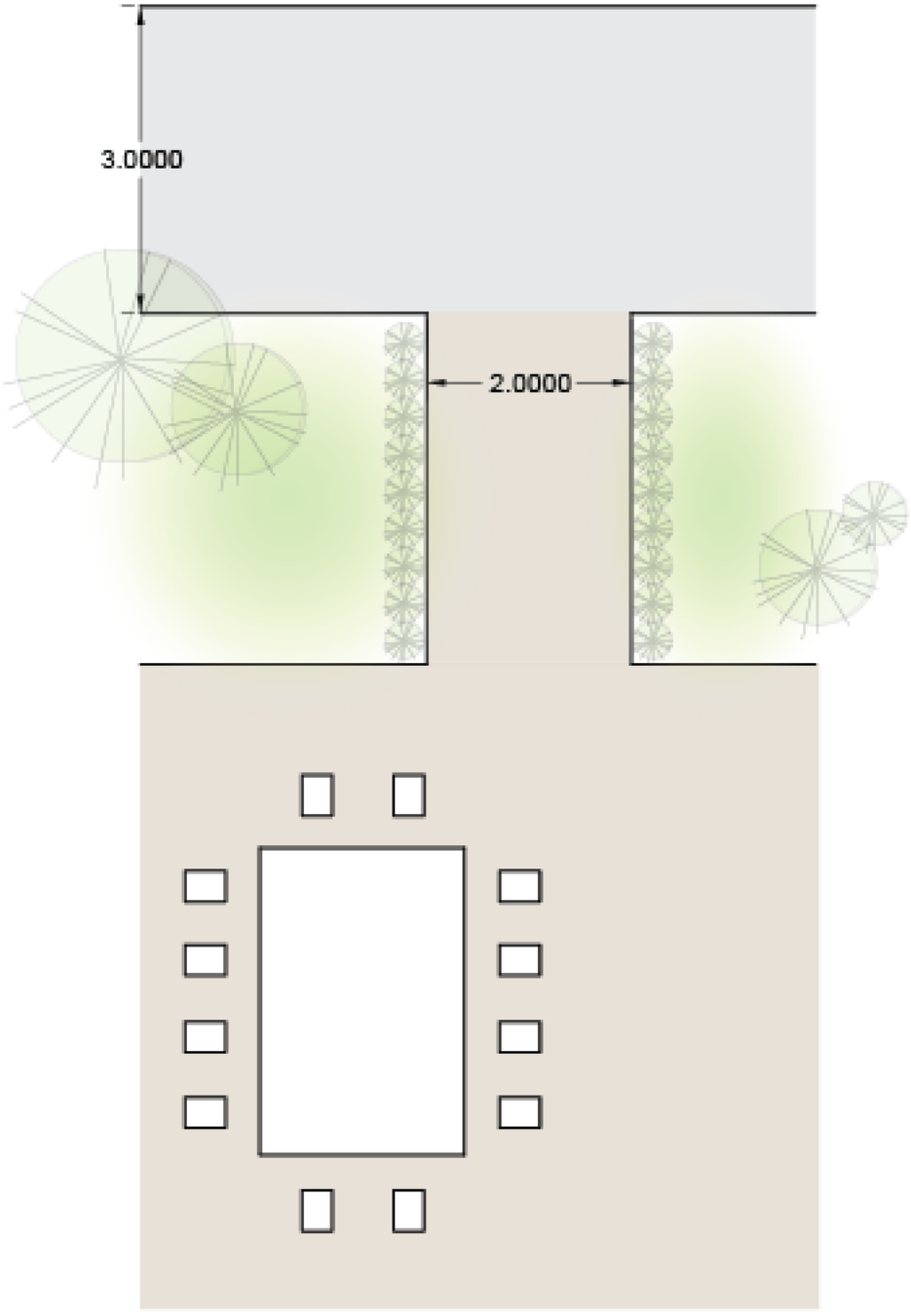


Figure 3. 42 Students are seeking for nature

27.

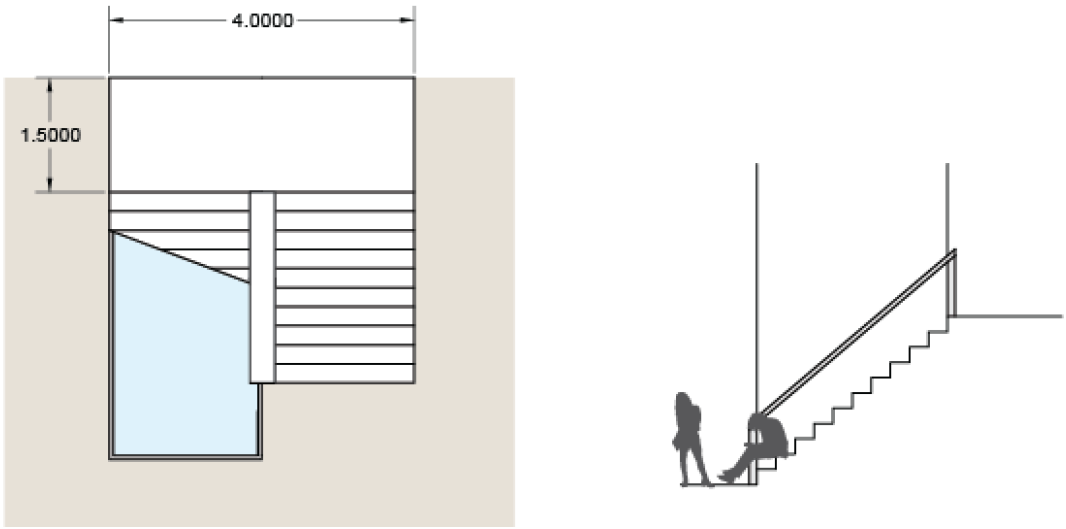
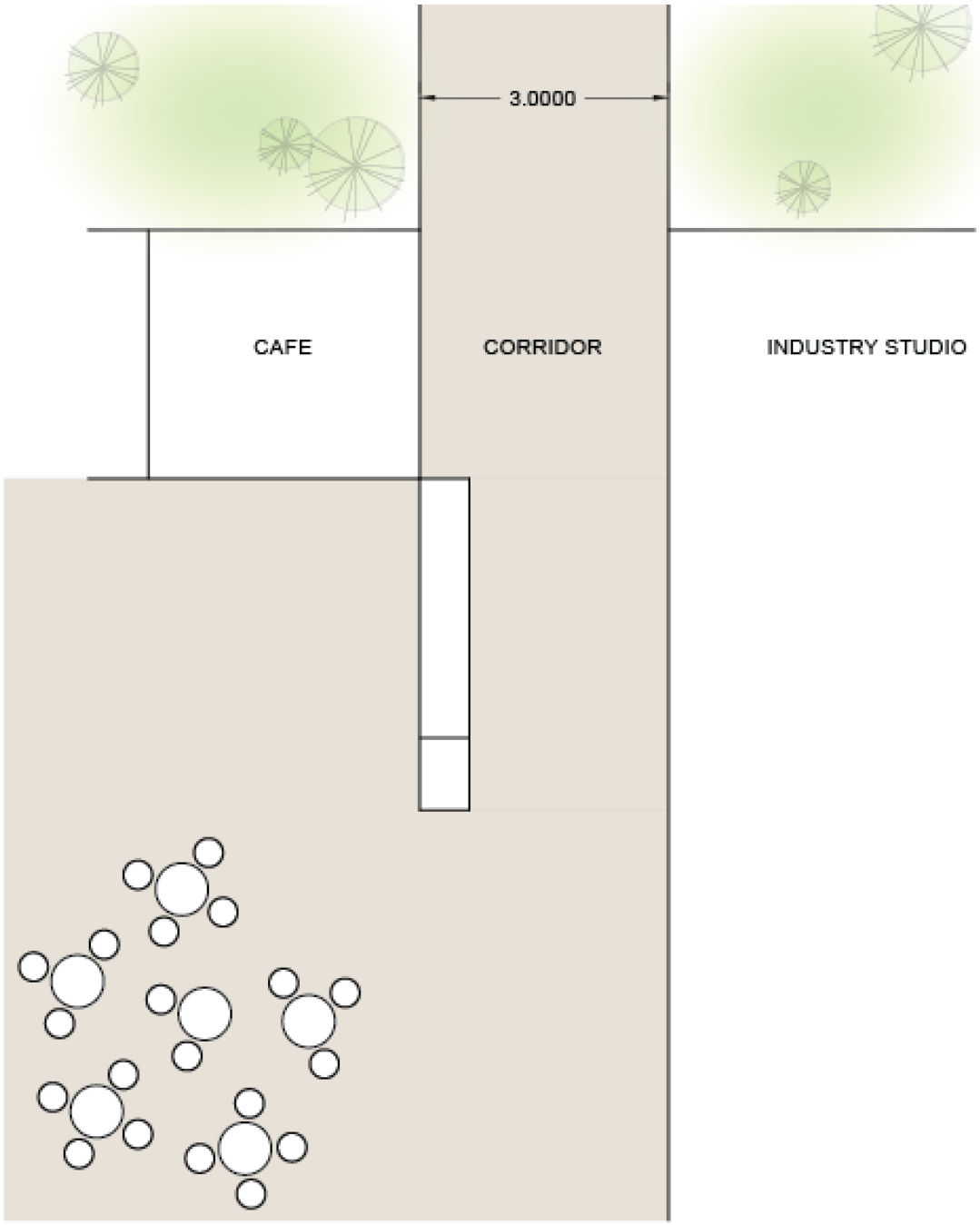


Figure 3. 43 Staircase near by small pond under the building

28.



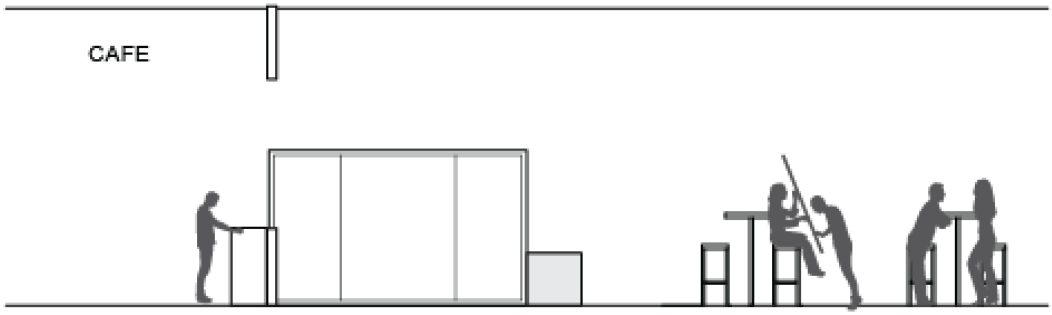


Figure 3. 44 Flow circulation in cafeteria

The elements and spaces above from number twenty-five to twenty-eight are from staff's observations. Most of the spaces that staff highlighted are semi indoor space that school provided for students to use. Those spaces have natural features supporting them. There are some circulation spaces near the classrooms that students use to gather for short periods before class starts. However, to make sure that students use the spaces as reported by the staff, examination in the next stage of analysis is necessary.

Analysis

To be able to understand the relationship between space and students, the observations can focus on a few factors. The figures below show the steps of how to apply the method of behavioral mapping. The control variables are time and number of students, the same as the analysis of Roong Aroon school and Satit Bilingual School of Rangsit University.

Figure 3. 45 The behavioral mapping of Satit Bilingual School of Rangsit Universit

Result

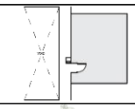
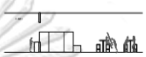
Place	No.	From Observation			Result from Observation
		Plan	Elevation	Image	
International School Bangkok (ISB) Corridor	25				
Seating at open space	26				✓
Stairs near by pond	27				✓
Stool chair and table near cafe	28				✓

Table 3. 3 The conclusion of observation emphasizes the space that was selected by students

Finding

The diagrams below resulting the students' selection of interaction space that connect to the nature environment visually and physically as the spaces are semi indoor spaces. In this case, most of the students selected areas provided by the school. For example, extended floor as boundary, open space for an outdoor view and seating space for activities. Moreover, an artificial pond in the building next to stair make the atmosphere even better for relaxing and concentrating on their work. The funiture is also important for students to choose the space, in this case mobile furniture was place in the shaded spaces for student to be able to move and adjust freely. From this case study, we can say that students considered shaded spaces as one factor when choosing spaces to use.

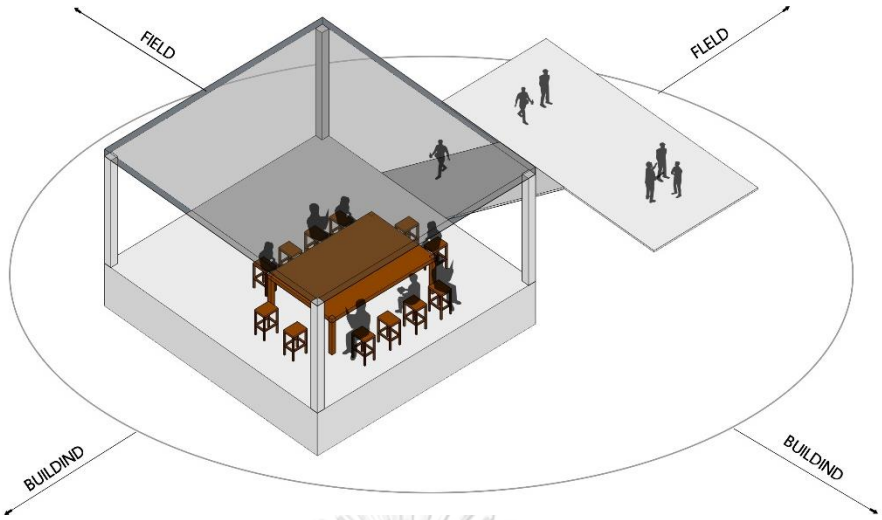


Figure 3. 46 The 3D dimension of number twenty-sixth

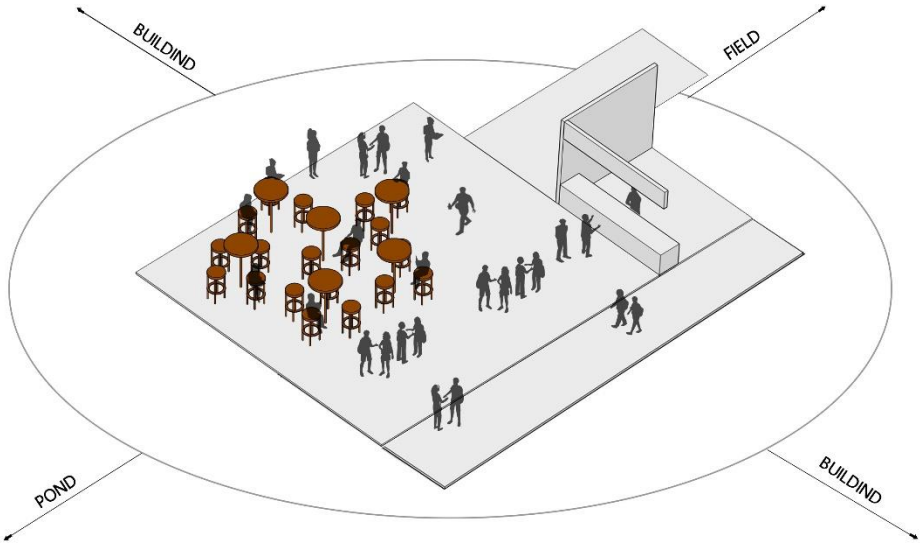


Figure 3. 47 The 3D dimension of number twenty-eighth

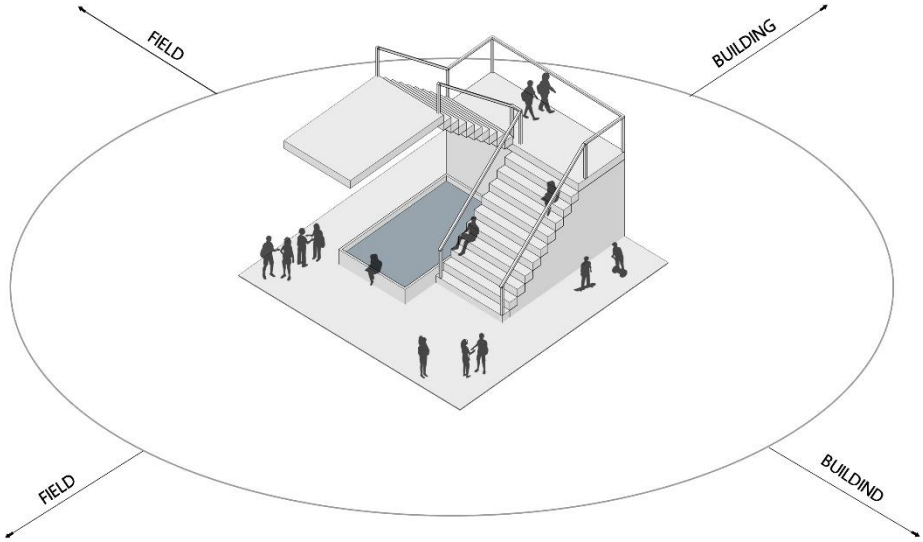


Figure 3. 48 The 3D dimension of number twenty-seventh

The conclusion of the findings shows the hypothesis is right about the outdoor space aspect. From the case study observation, not every outdoor space interests students for forming their learning space. The factors that make students choose those spaces are atmosphere and level of privacy. For example, green space, water, open space, open floor plan and some elements that can define the boundaries.

This finding can be useful to help carry out the design of the demonstration school. Next step of designing the school will combine both the theory and the findings together.

Chapter 4
Design Process

Designing North Bangkok Demonstration School needs to have a base in the theory and architectural elements that are found under the concept of contemporary learning which will enhance the idea of contemporary learning spaces. The theory of indoor, outdoor and informal learning spaces have been conducted into the design of contemporary learning spaces. The adaptability of spaces for various functions and activities and open plan is the key idea that results in creating a contemporary space. Moreover, a good environment including natural elements such as trees and gardens are also to be considered in the design. Yet, the other part of primary school design standards were mentioned about the structure in designing primary school. For example, layout, lighting, sound, temperature, choice, flexibility, connection, complexity and texture are about those indoor and outdoor spaces design. Furthermore, Neufert Third and Forth edition were carried out in some part that is relevant to North Bangkok Demonstration School. Last but not least, the result of architectural elements from case studies can be more interesting when combined with the architecture itself.

Designing North Bangkok Demonstration School needs to consider design concepts, programs, users and site analyses to better understand the design and context around the site as the following information.

4.1 Design Concept

How to better design North Bangkok Demonstration School to contemporary learning?

From the question, North Demonstration School is focusing on the concept of ‘free space’ and ‘interaction’ to be core concepts in the design of the school. Free space means open space and with flexible use for a variety of activities. Then, for interaction, it includes visual interaction and physical interaction between teacher, student and

nature. The design should concern those two aspects to form the school. The relationship between outdoors and indoors is also need to be considering, as classrooms needs a view outside for interaction aspect and for student concentration. The result of school design should enhance the ability of student to learn and to interact with teacher and among students.

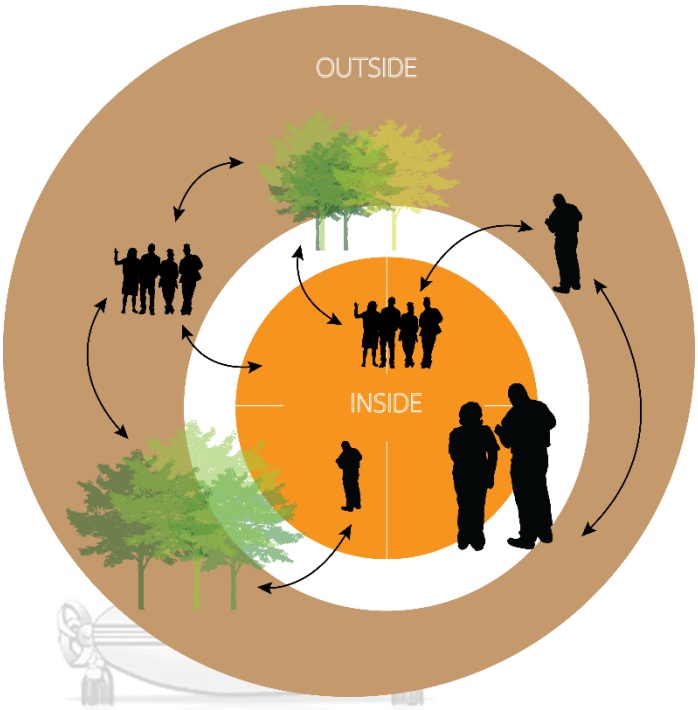


Figure 4. 1 Conceptual diagram of free space and interaction

As North Bangkok Demonstration School is a primary school level, with students aged six to twelve, consideration of the age of the students is needed. At this age, students would prefer something that is fun and arousing to them in order to get and maintain their attention.

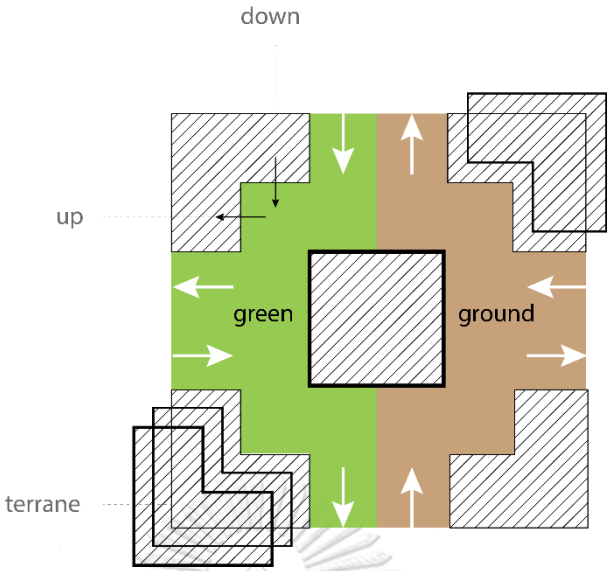


Figure 4. 2 Landscape concept of North Bangkok Demonstration School

The space design that would catch students' interest and answer the research question would be a 'Playground' concept for landscape, as in the figure above. This concept of landscaping will create different ground levels, which is similar to the movement when students are playing in the playground. The movement of up and down, fast and slow is applied into the spaces and circulations of the landscape. This playground concept is a combination between green and ground as it provides a natural feature environment. The flow and open space of a playground is represented by white arrows. Giving a variety of spaces to be created among students and flexible enough to meet the criteria of the of contemporary learning space. Stacking boxes represent 'Terrene', the level of ground, as an optional element that can be transfer from circulation to learning space.

4.3 Site

4.3.1 Law and Regulations

North Bangkok Demonstration School is located in Pathumthani district on Rangsit-Nakhonnayok Road. According to Law and Regulations this land falls in the Purple zone, which is zoned for Industrial and Production. There are two regulations: 1) Use land for main business and 2) Use land for auxiliary business. In this case fall in

regulation number 1, which allow public utility, industrial and storage. Schools fall into the category of public utility without any conditions. FAR of this site is unlimited.

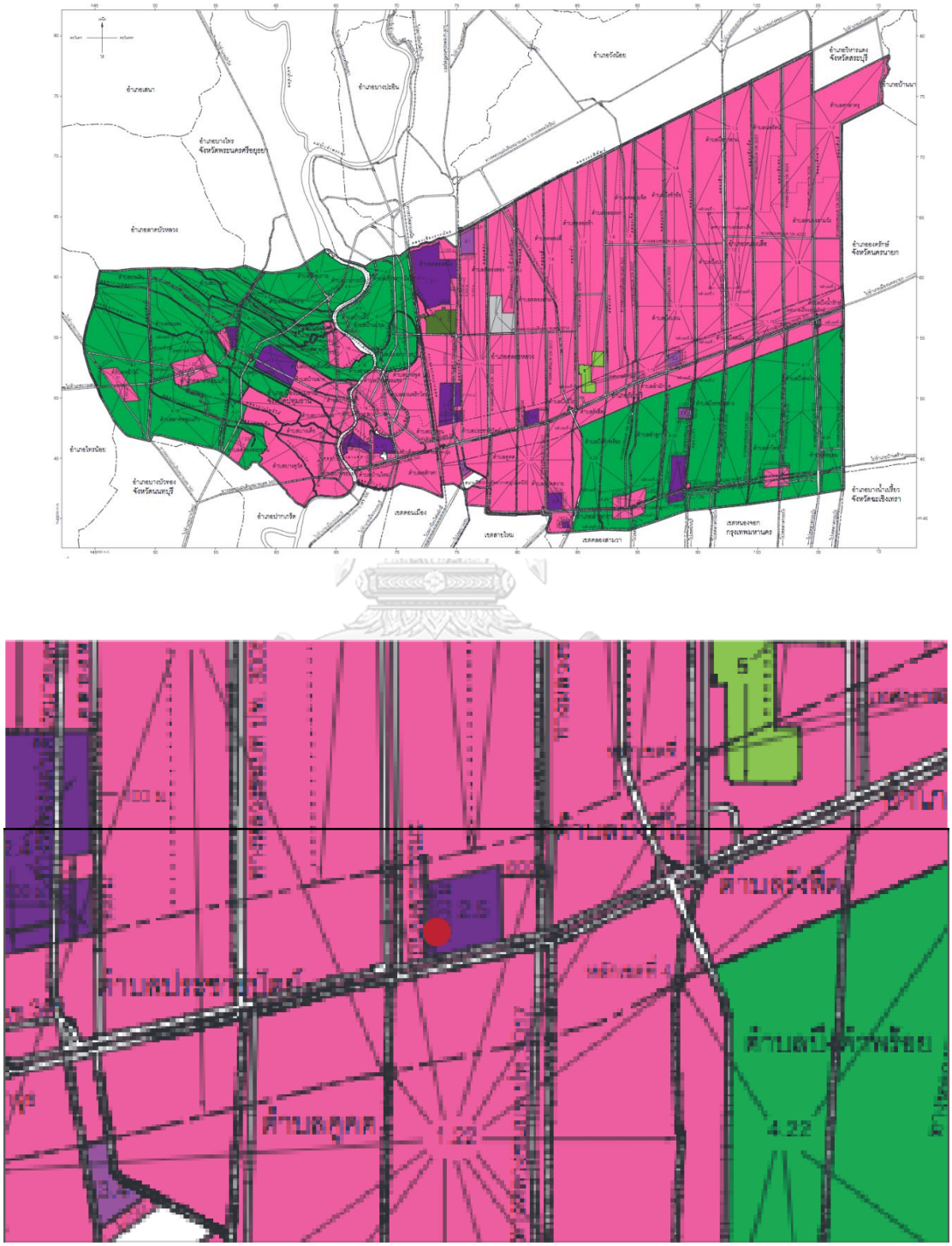


Figure 4. 3 Bangkok zoning, the site located in purple zone

4.3.2 Existing Conditions

The area in radius of 300 meters from the site is surrounded by retail stores, factories, an education center, restaurants and government buildings. Within 1 km is a full village and community, with a community mall, temple, vet, stadium, gas station, school and amusement park. There is potential in building the demonstration school here as it will be the only school in this area that that focuses architecturally and in terms of curricular on a new way of learning.

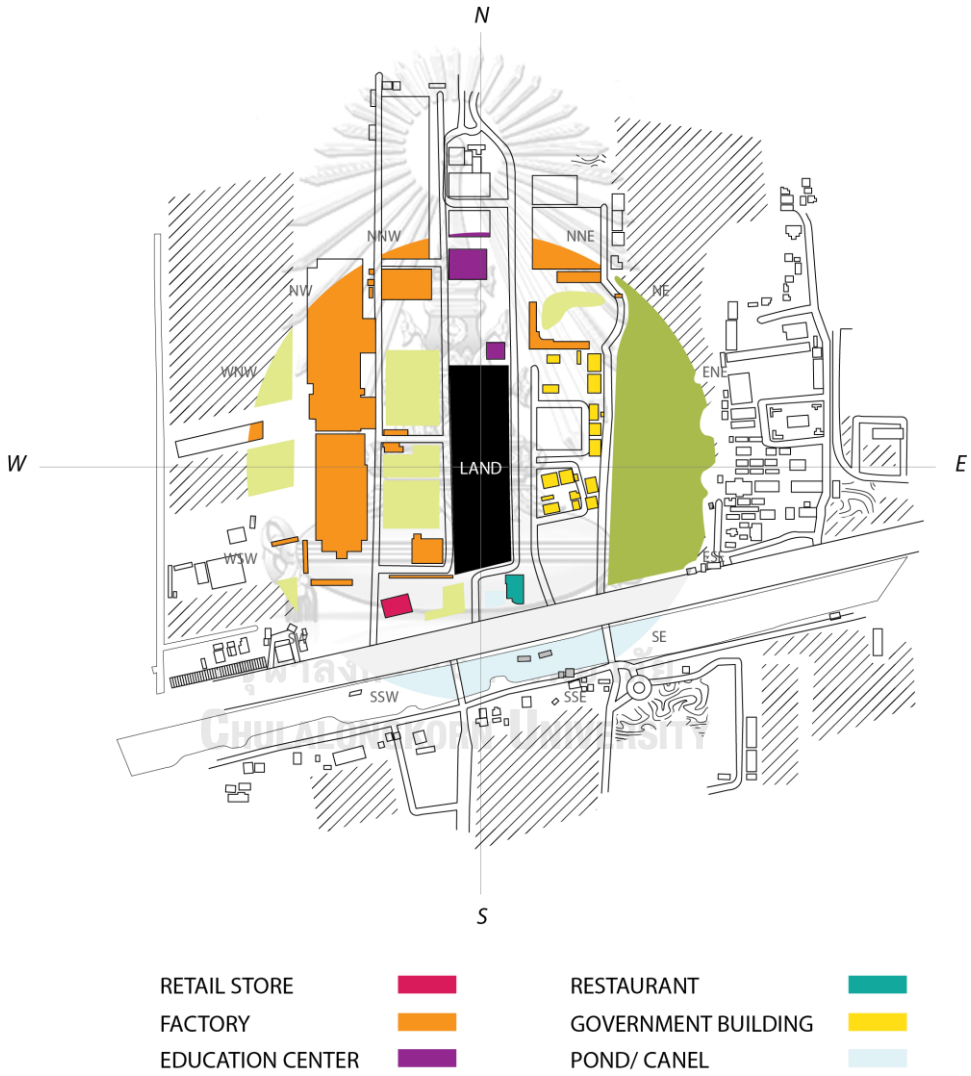


Figure 4. 4 Activity around the site

4.3.3 Transportation and Land Development

Most of the area in Pathumthani district is a combination of undeveloped fields and buildings. North Bangkok Demonstration School is in between a developed field (a soccer field) and an undeveloped field (rice field). However, the accessibility to the site is still convenient, there are 2 bus stops within 100-200 meters. These 2 bus stops B3 and B9, are served by bus line 188, 523, and 538, all of which serve nearby urban area and suburban areas.

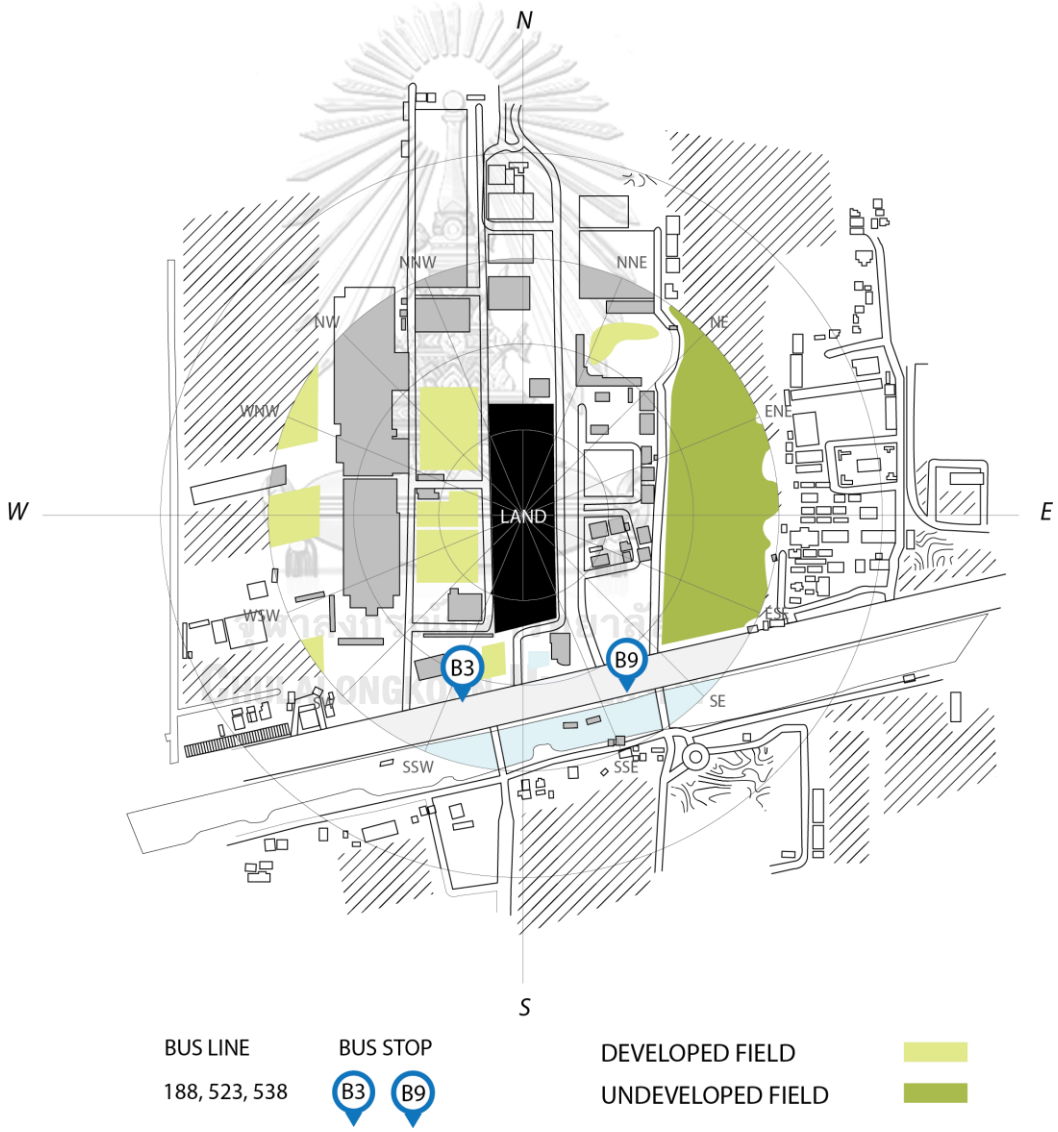


Figure 4. 5 Green area and transportation around the site

4.3.4 Climate

Lighting is the most important part for school as it effect directly on student's learning. The sun path diagram of Thailand shows the direction of the sun, following the earth axle. The red line, yellow line and blue line show each month according to each season.

As the North Bangkok Demonstration School is facing toward North, it can be read from the diagram that most of the year South side would receive the most sunlight. According to this diagram, when designing openings in the building, efforts should be made to ensure the south side is sufficiently covered to avoid overheating the building. For example, a façade, trees or shading would be good to protect the southern aspect from light and heating.

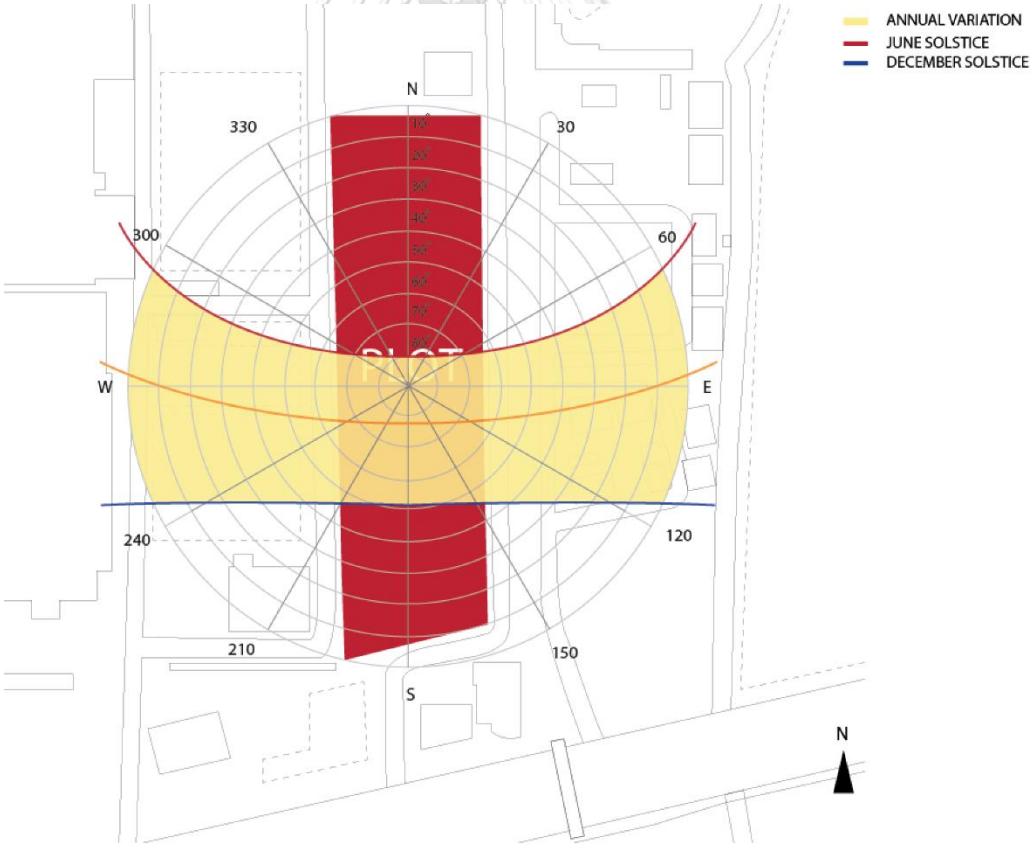


Figure 4. 6 Sun path diagram of Bangkok, Thailand

4.3.5 Visual and Circulation within the Site

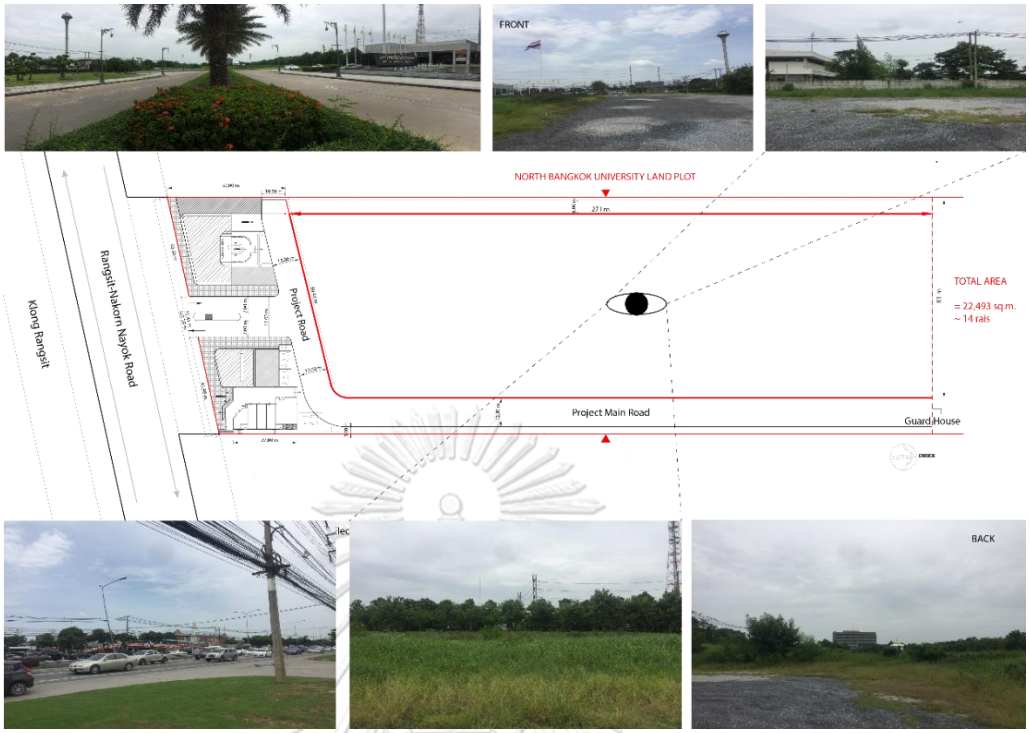


Figure 4. 7 Existing site surrounding

The circulation within the site is easy for travelling as it wide enough with 4 lens provided. Within the site circulation, there are North Bangkok University at the back of the land plot. Forcing the main entrance of North Bangkok Demonstration School to be in front, facing out to the main road. The visual from site existing present mostly trees around the site. Some roof of the neighbor building is shown but doesn't affect much on the beauty of visual effect.

4.2 Program and Users

Students who attend this demonstration school have to follow the Basic Education Core Curriculum Act B.E. 2551 that promotes eight-subject area;

1) Thai Language
2) Mathematics
3) Science
4) Social Study Religion and Culture
5) Health and Physic Education

6) Arts
7) Occupation and Technology
8) Foreign Language.

Yet for facility and service for both teachers and students can count into 20 things which are 1) Library, 2) Conference room, 3) Sport hall, 4) Teacher room, 5) Locker room, 6) Storage room, 7) Swimming pool, 8) Language laboratory, 9) Pantry, 10) Cafeteria, 11) Nurse room, 12) Cooperative room, 13) Administration, 14) Parking, 15) Electric room, 16) Water pump room, 17) Staff room, 18) Restroom/Bathroom, 19) Computer room. The used area of each space and programs were show in the figure below.

ORDER	PROGRAM	NO.	SQ.M./ROOM	SUM OF SQ.M.
1	CLASSROOM (GRADE 1 TO GRADE 6)	12	100	1,338
2	SCIENCE ROOM	2	40	80
3	LIBRARY	1	187.5	187.5
4	LANGUAGE LABORATORY	1	100	100
5	CONFERENCE ROOM	1	700	700
6	NURSE ROOM	1	45	45
7.	COMPUTER ROOM	1	125	125
8.	STUDENT BATHROOM (MALE)	4	28.52	117.53
9.	STUDENT BATHROOM (FEMALE)	4	28.62	117.53
10.	CONFERENCE BATHROOM	1	75.40	75.40
11.	TEACHER AND ADMIN BATHROOM (MALE)	1	30	30
12.	TEACHERAND ADMIN BATHROOM (FEMALE)	1	30	30
13.	TEACHER ROOM	14	20	280
14.	LOCKER ROOM	2	279.5	559
15.	ADMINISTRATION	9	30	270
16.	PANTRY	1	80	80
17.	CAFETERIA	1	426.25	426.25
18.	STORE	1	35	70
19.	STORAGE	1	47.77	47.77
20.	ELECTRIC ROOM	1	18	18
21.	CO-WORKING SPACE	1	468.63	468.63
22.	SPORT HALL	1	2,174.32	2,174.32
23.	CAR PARK	60	40	2,440
24.	SWIMMING POOL	1	300	300
	TOTAL AREA			7,065

Table 4. 1 Tabulation chart of School's facilities

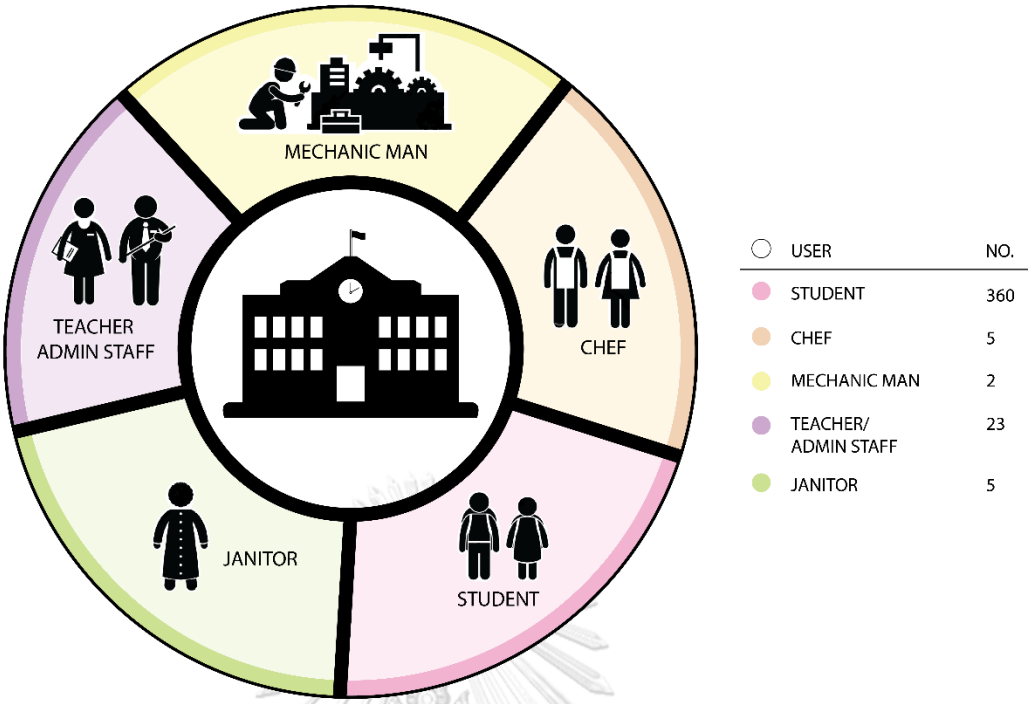


Figure 4. 8 Diagrams of number staff in schol

This North Bangkok Demonstration School consists with over all 360 students from Grade 1 to Grade 6. Each level provides 2 classrooms with 30 students/teacher with over all 12 homeroom teachers. Yet there also 2 more teachers that take care of physical education and health with those will positioned at the sport hall and nurse's room. Other staff are divided up into 5 janitors, 5 chefs and 9 administration staffs. The total number is 395 people.

4.4 Design Development

The site of North Bangkok Demonstration School is long and narrow site which is a challenge for the design as on the left and right sides are factories. The layout of each facility needs to consider noise pollution that could disturb the students. The appearance of the site should make the students feel at home. The design development stage will focus on the layout of each facility/element in relation to sites surroundings and lighting.

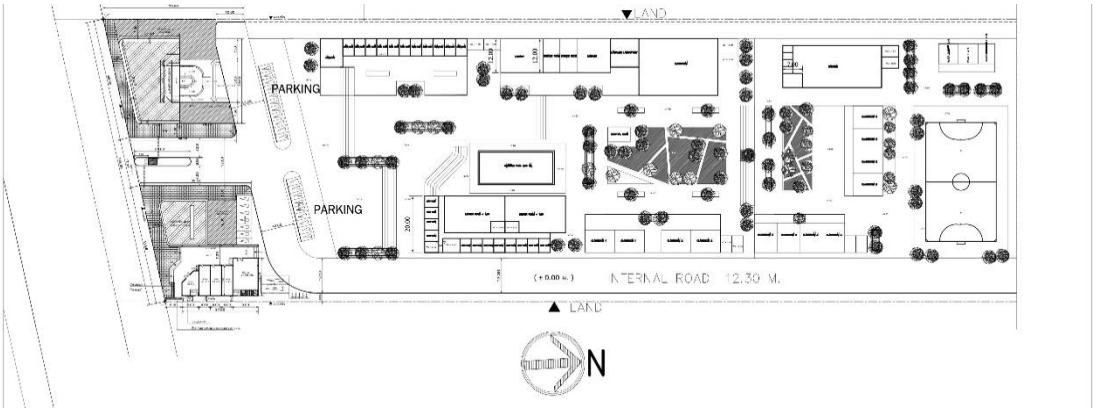


Figure 4. 9 First scheme of design development

In the first design scheme, the welcome space at the entrance should emphasize welcoming and be a grand space, which allow the efficient movement of traffic at the beginning and end of the school day. However, the layout of locker room and swimming pool still is a problem because they are at the central space.

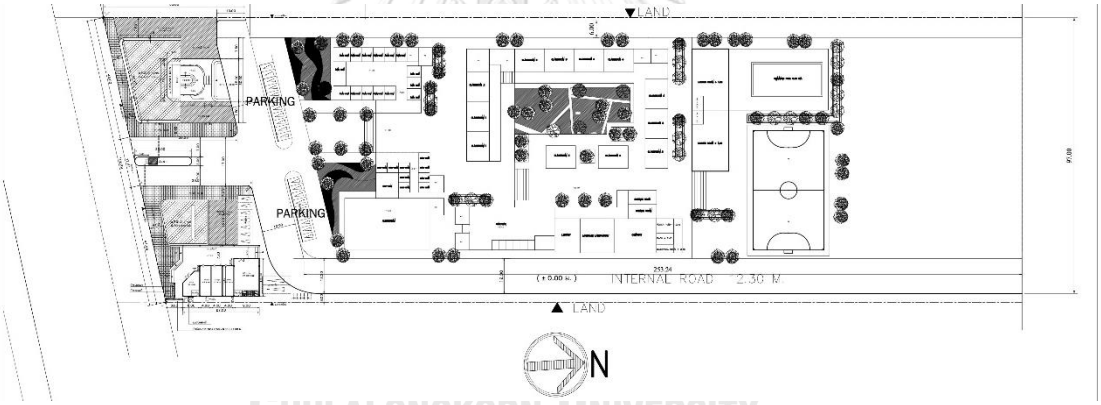


Figure 4. 10 Second scheme of design development

In the second design scheme, the problem of the swimming pool and locker room is fixed as it is moved to the back of the school with the sport hall. In this scheme, a big courtyard is at the center, surrounded by all the classrooms, following the concept of visual and physical interaction. However, the overall concept still does not go together as one school and the spaces are still lacking continuity.

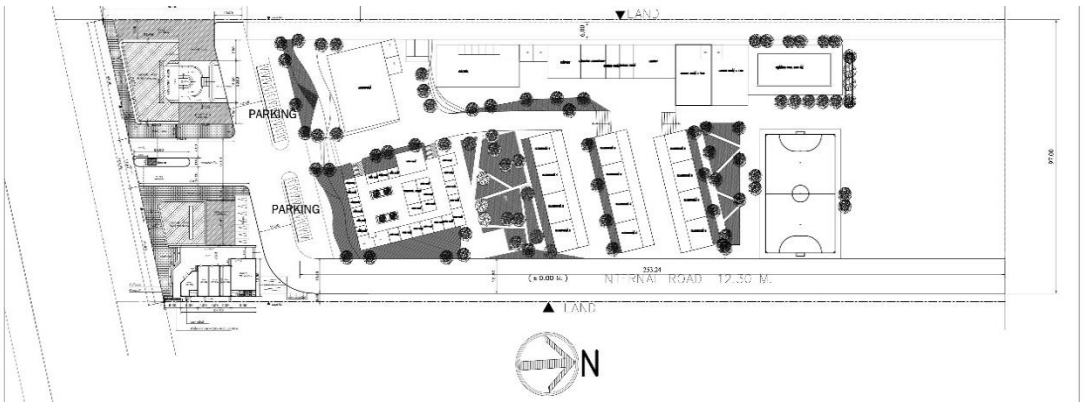


Figure 4. 11 Third scheme of design development

The third design scheme, aims to solve the problem of a lack of continuous space in the layout, using landscape to help bring all the elements together. However, the grand welcoming space in front is forgone. However, the benefit of this design scheme is that every classroom has its own learning space at the rear of the room. The learning space connected to the circulation and yard can be expanded to support a range of activities.

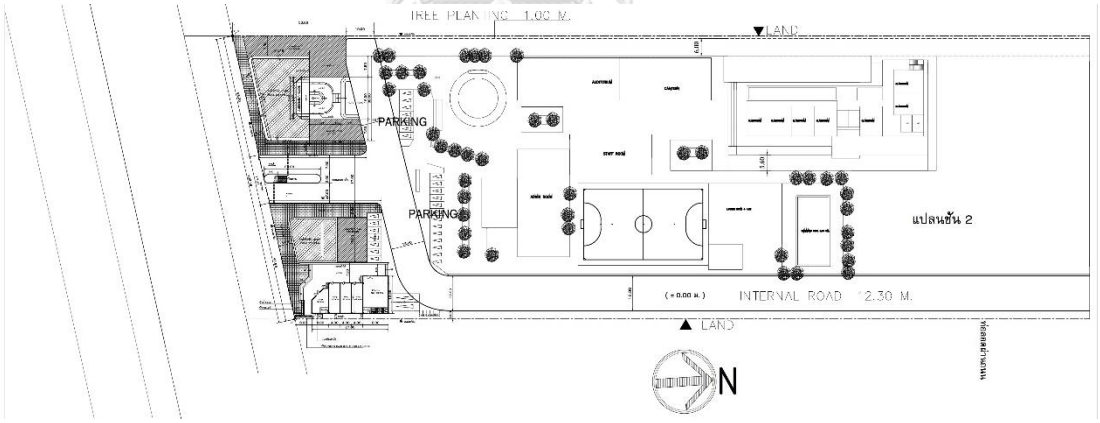


Figure 4. 12 Forth scheme of design development

In the forth design scheme, the layout of the school is redesigned, moving the sport area to be side center of the site. In this case the big field can create a good visual atmosphere for students to form their learning space around this area. It still retains the grand welcoming space for visitors. However, the problem of drop off and traffic circulation needs attention.

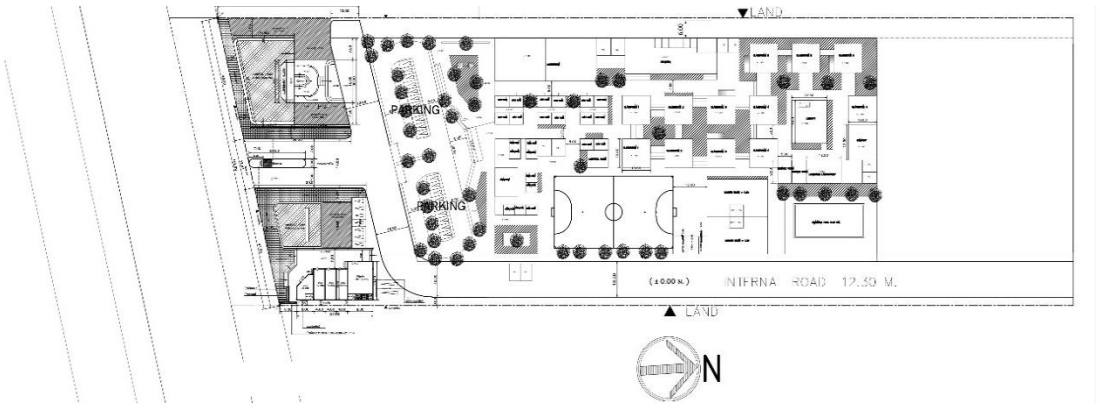


Figure 4. 13 Fifth scheme of design development

In the fifth design scheme, the problem of car park and drop off is still present. However, the concept of cell design layout is shown. As North Bangkok Demonstration School is a one floor plan, it is easier to break down each facility/element by having circulation and green design in between each building. In this case, the overall plan will look more fun like a 'Playground' and meet the requirement concept of interaction.

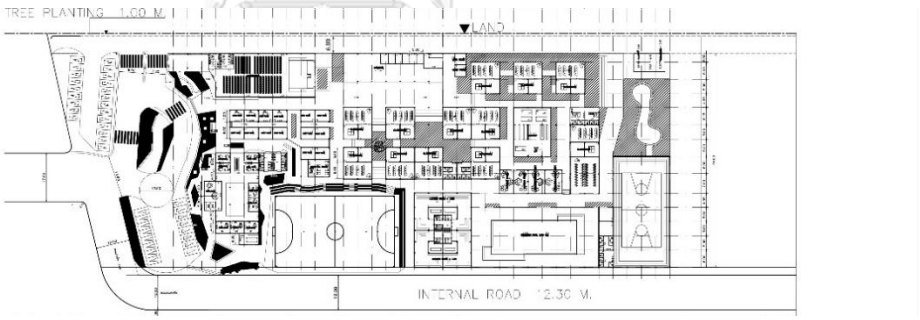


Figure 4. 14 Sixth scheme of design development

In the sixth design scheme, the traffic issues are resolved with the car park separated into visitor and staff areas. The round about and entrance area are big and wide enough for drop off and pick up of students. In this design, terrene were added to create variety of ground level to link to the concept of a playground. It is better than every scheme because this design scheme allows students to use every single sq.m. of the site. Nature and circulation are combined together. With this, it allows circulation to be part

of the learning space. Every door opens up to an outdoor space and connects to a green area or at least a space that can transfer during class period and break period.

Final Design

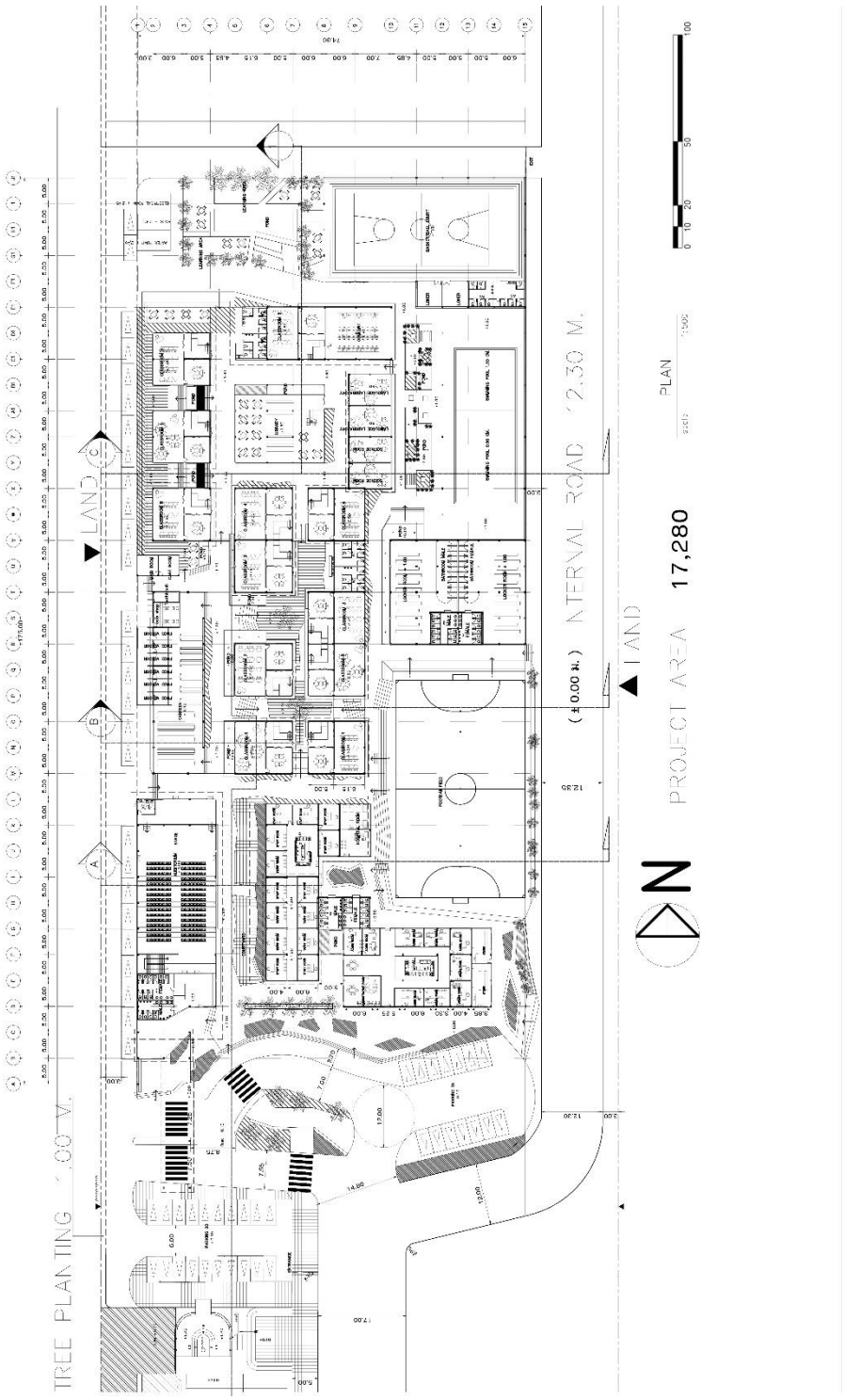


Figure 4. 15 Overall Plan of North Bangkok University

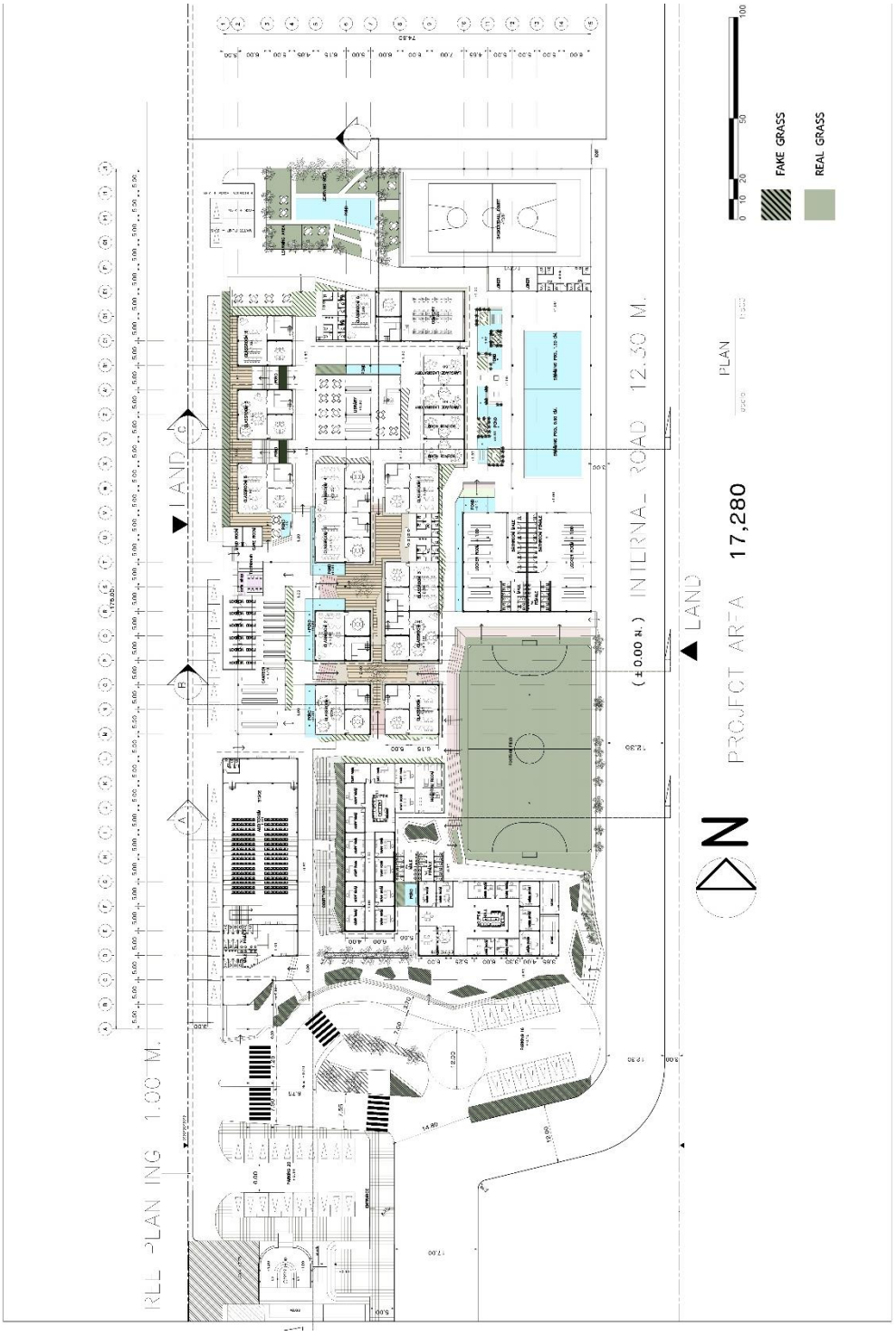


Figure 4. 16 Overall Plan of North Bangkok University, showing architectural element

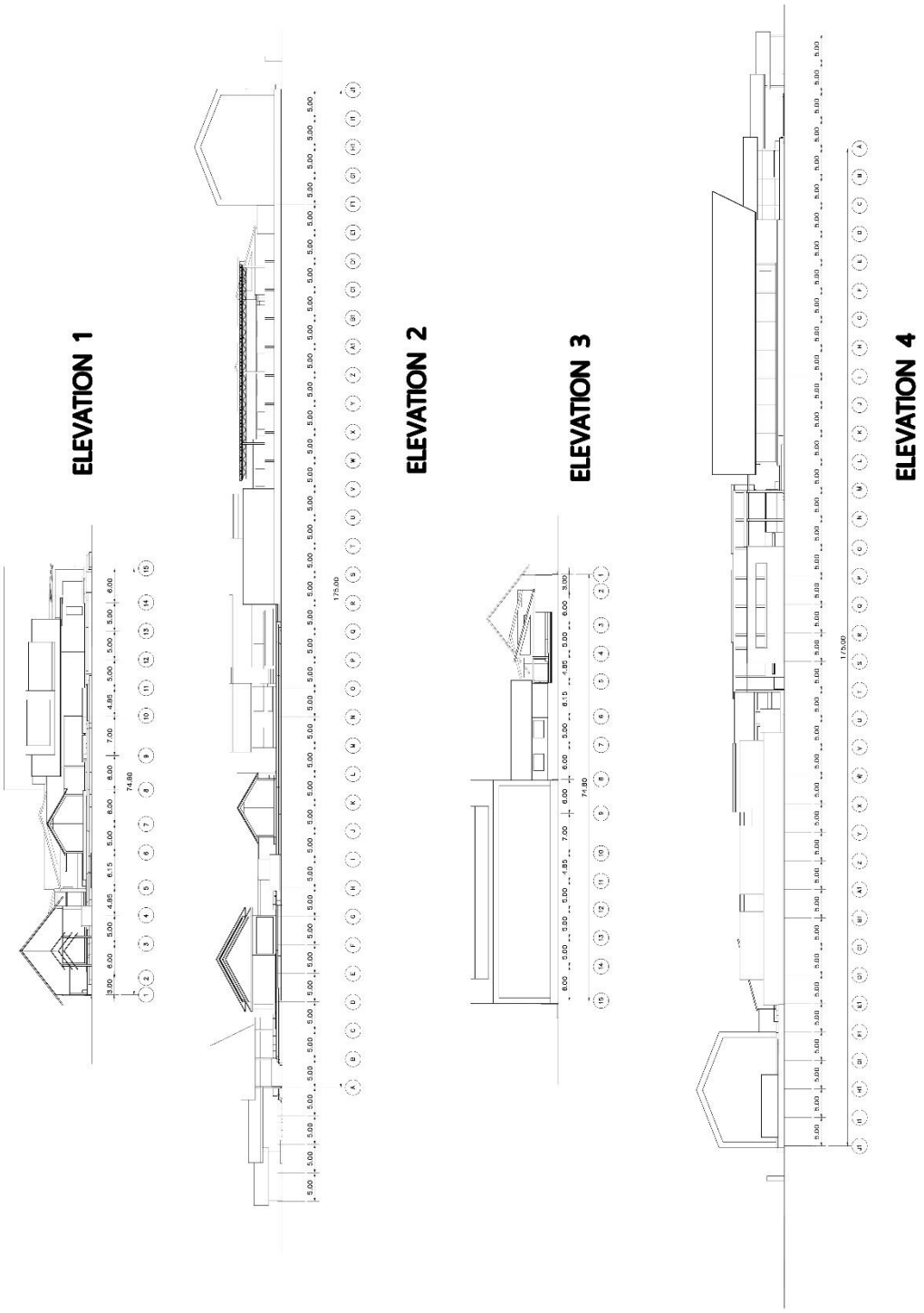


Figure 4. 17 Four elevation drawings

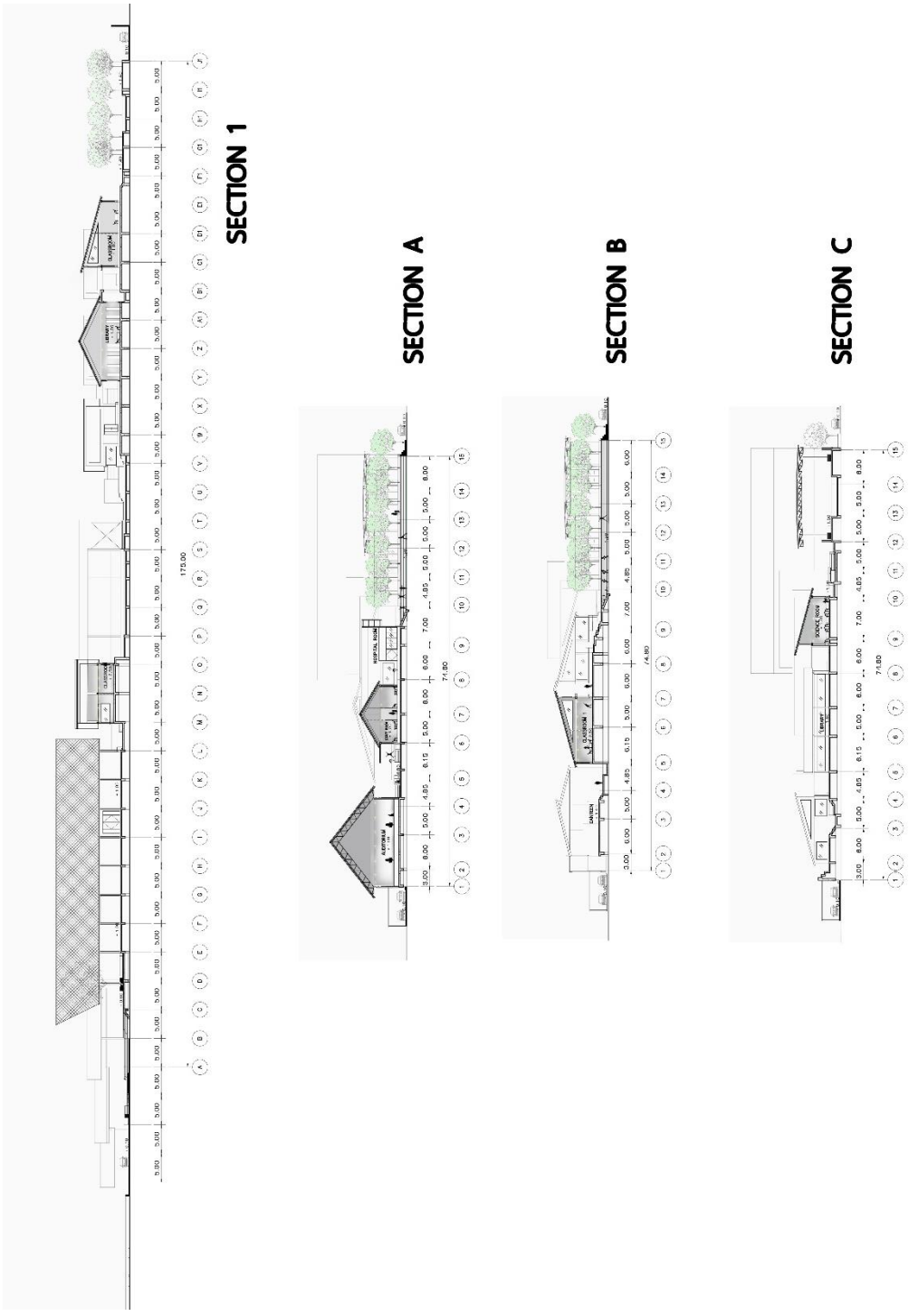


Figure 4. 18 Four section drawings

What are architectural elements that support students' learning?

The architectural element from the case study observations can be concluded into eleven architectural elements that students choose. These elements can be integrated into the following design elements of North Bangkok Demonstration School.

1.

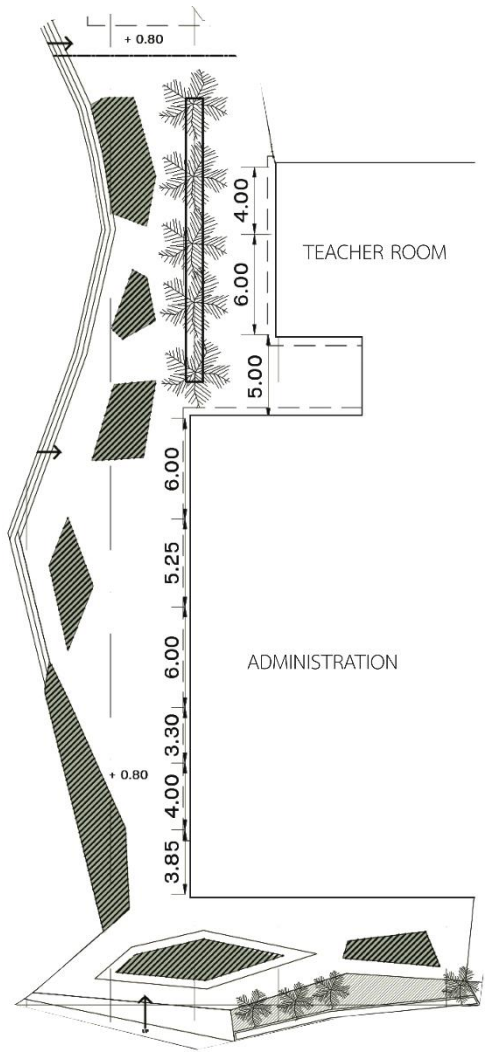


Figure 4. 19 Welcoming space

The 'Welcoming space' in front of the school meant to be gathering node for teachers, parents and students. The space is design to be open and flexible with the circulation along the way up to the main space. The providing atmosphere is making people feel

fun and relaxed while they sit in this area. Students can still transfer this welcoming space to their learning space around the corner seating and the green square.

2.

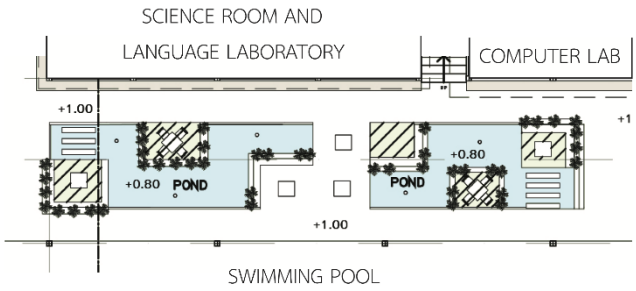


Figure 4. 20 Reading space

This ‘Reading space’ has a close relationship to nature, as it shown the pond surrounds the extended floor, which are covered with grass. This idea gives a variety of levels of privacy, depending on how students use the space. With the space, it can be both quiet and playful.

3.

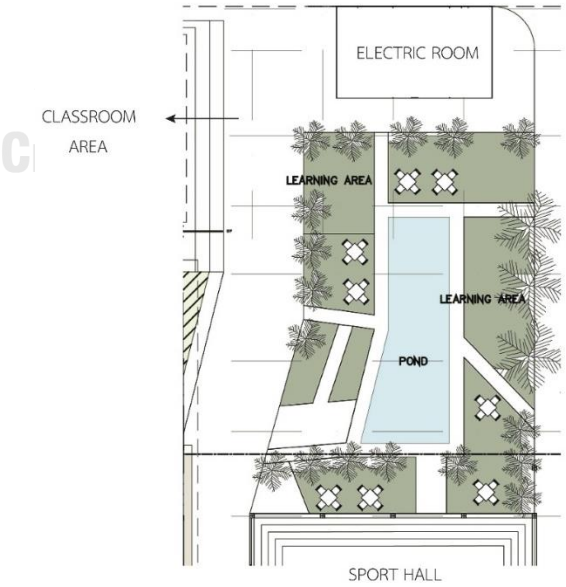


Figure 4. 21 Outdoor learning space

The ‘Outdoor learning space’ is at the back of the learning area that connects to the sport hall. This space is where students can do class activities or create their own

learning space. Yet, this space still provides an opportunity for relaxation. The pathway within space will emphasize to students to use the space wisely as it help creates a boundary for certain activity or group work.

4

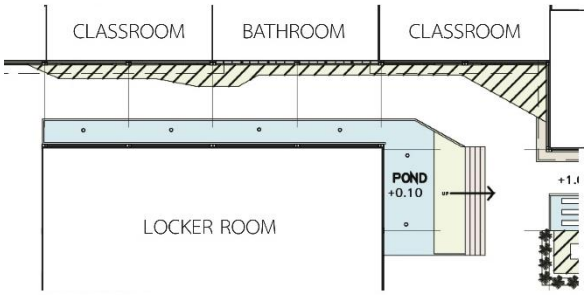


Figure 4. 22 Water deck

The ‘Water deck’ space is a stair to go down to the pier as a circulation and seating space. The stair faces down to the green area and pond, with natural features. The seating along the building edge also gets the sense of nature from the pond. Acoustic from water is cool down the area and the students’ mind.

5.

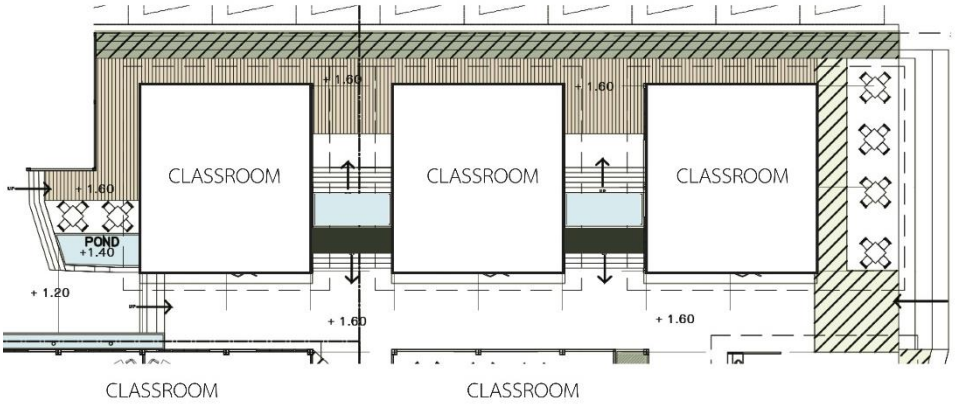


Figure 4. 23 Planting spot

This space, ‘Planting spot’ emphasize the idea of levels. The middle stair in between the building is linked to the concept of visual interaction and physical interaction as the green space and water space were set apart to different levels. Also 4-5 students

were able to fit in this space to create their group work. The design of this space creates a sense of boundary. The planting stairs at the back change the atmosphere of the white wall to a vertical garden. Students can learn how to plant in certain subjects. These planting stairs represent a decoration object that support the atmosphere of student's space selection. Furthermore, the provided chair and table were positioned next to the pond and green area, as it would help student to spend more time on their activity comfortably and aide concentration.

6.

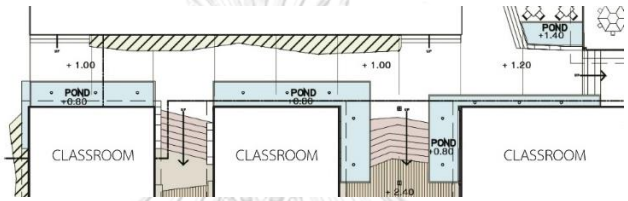


Figure 4. 24 Space within cafeteria zone

The main circulation from the cafeteria provides the learning space itself. The seating space from both side are facing together which allow interaction among students. Moreover, the fountain in the area makes lively space. This space represents 'activity node' area for student as it near the cafeteria, allow grab and go movement.

7.

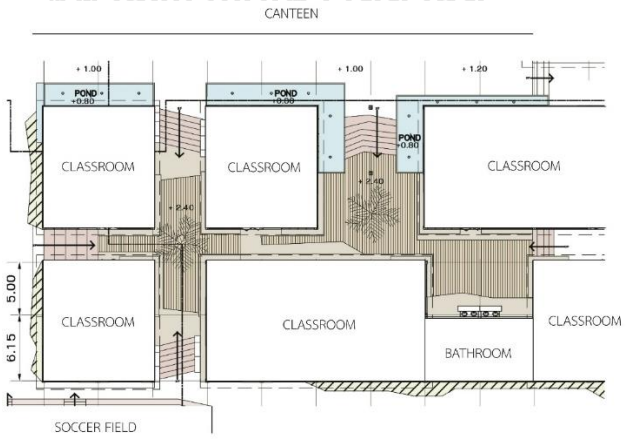


Figure 4. 25 Deck space

The 'Deck space' present as a brown space next to the cafeteria, is the main space which connects all the circulation to classrooms allowing the idea of an open plan

and flexible. Student and teacher are able to interact with each other both indoor and outdoor.

8.

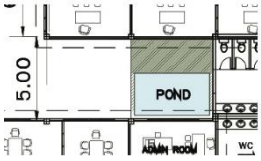


Figure 4. 26 Font relaxation

The ‘Front relaxation’ space is for teachers and staff to have a good view from inside of the building. However, the space is private enough to be a learning space for students. The solid wall surrounded is a boundary for students.

9.

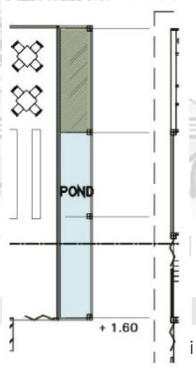


Figure 4. 27 Library area

The ‘Library area’ provides natural features, as it is public space for student. The green space and water create an extension of the library space. Students can sit along this area. Yet it emphasizes the feeling of welcoming to library.

10.

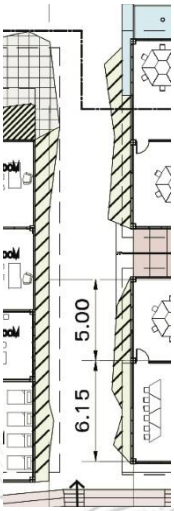


Figure 4. 28 Circulation space between administration and classroom

The transfer space from the administration area to the classroom area also provides seating space at the edge of the building. This area of seating has a view of the soccer field, which give the sense of nature.

11.

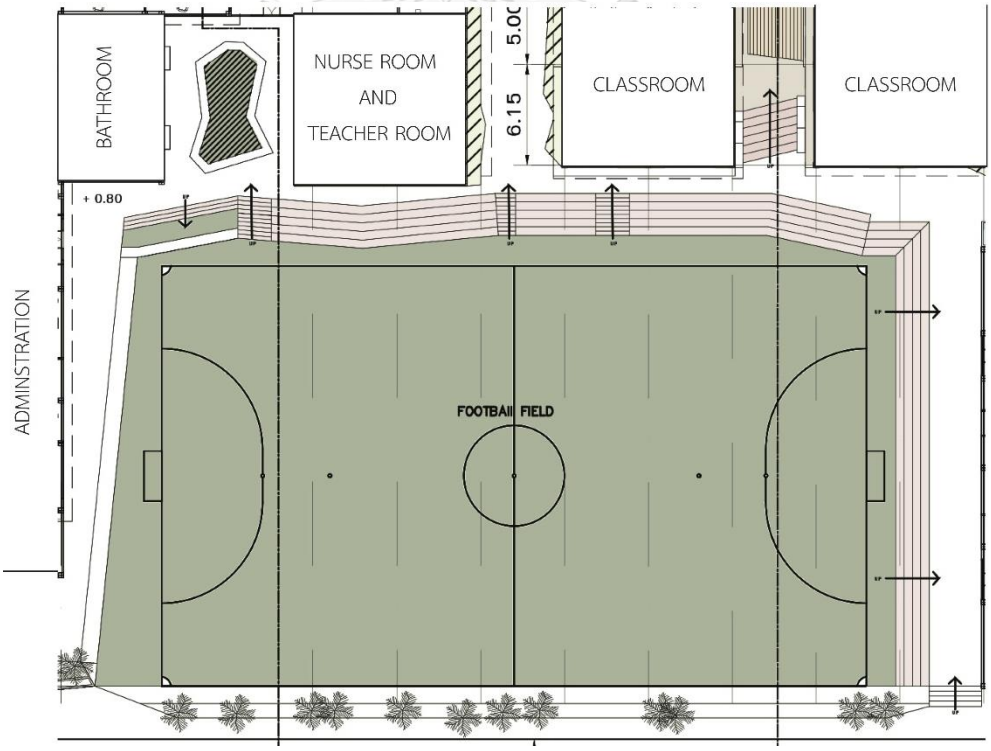


Figure 4. 29 Soccer field

The soccer field space allows a variety of activities such as playing and running. However the space around the edge of the soccer field allows students to have a good view from the elevated space. Green areas clam down student mind and make student more focused.

12.

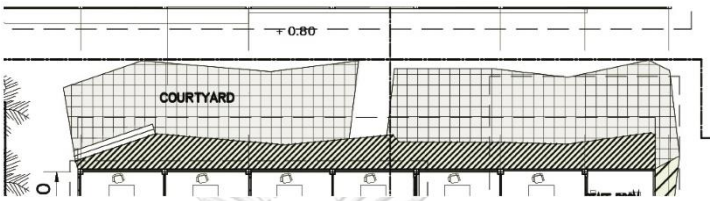


Figure 4. 30 Stage space

The ‘Stage space’ is next to a welcoming space and elevated from the ground level and allows for many activities, including stage performaces or practice area for presentations.

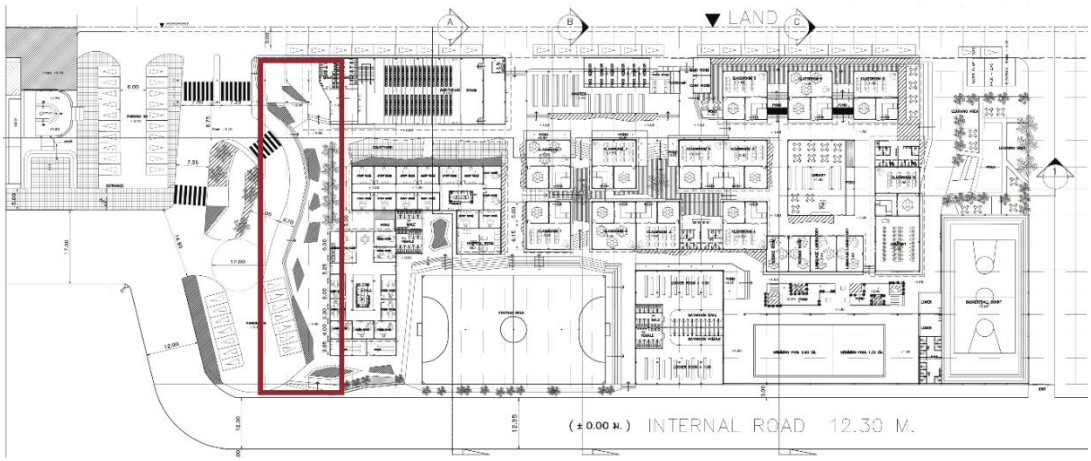


Figure 4. 31 Welcoming space

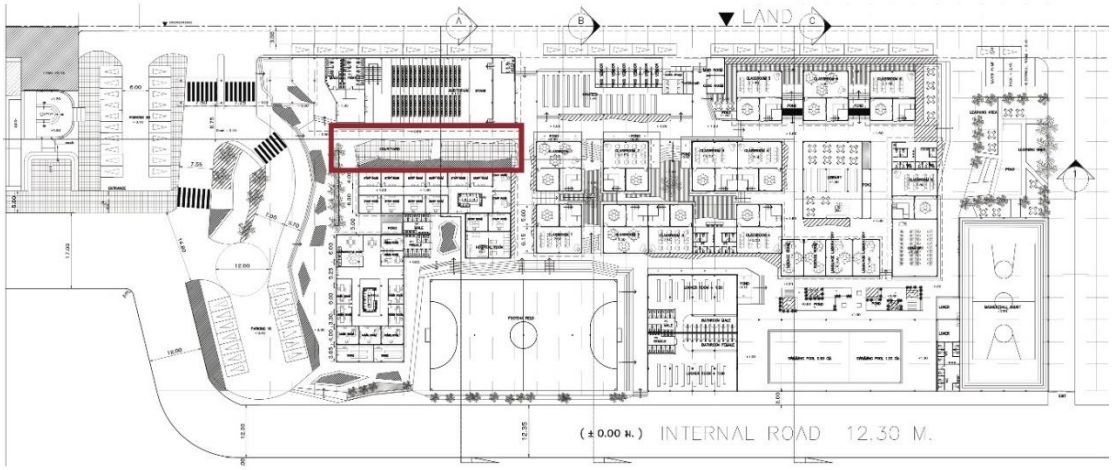


Figure 4. 32 Main stage

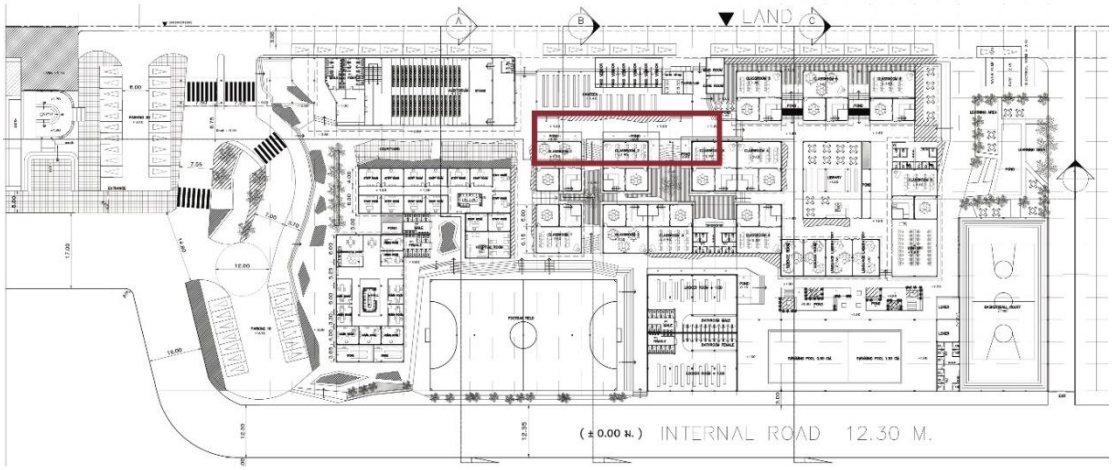


Figure 4. 33 Cafeteria space

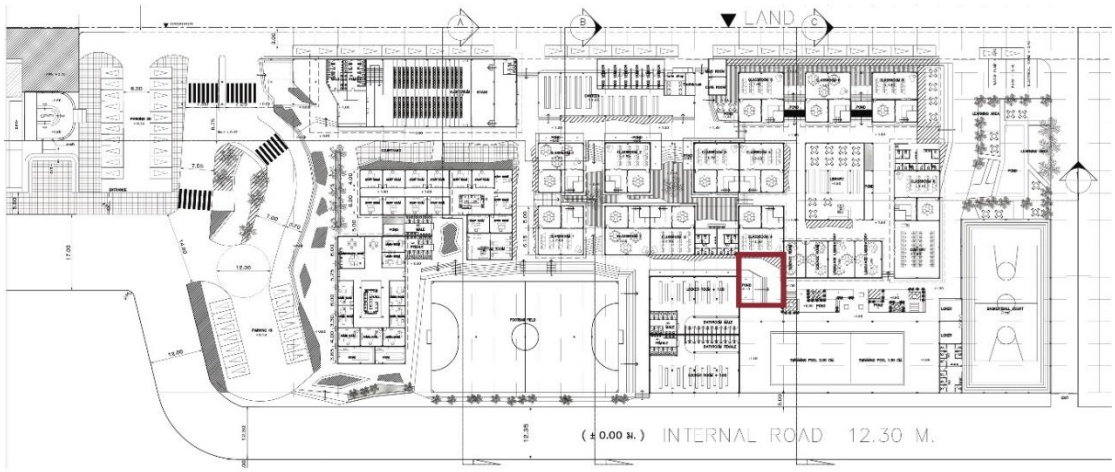


Figure 4. 34 Swimming pool area

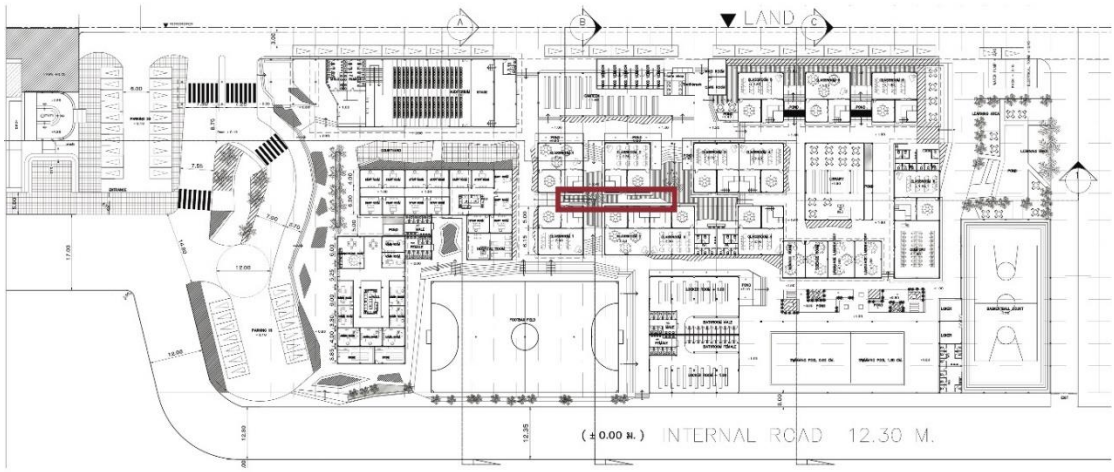


Figure 4. 35 Classroom area

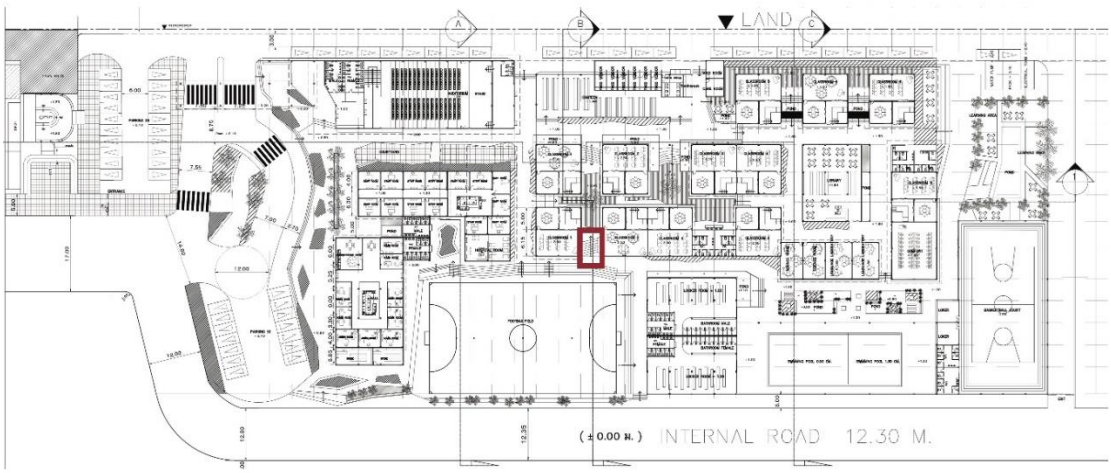


Figure 4. 36 Stair space

The final design of North Bangkok Demonstration School is mainly focused on potential site issues such as the surrounding factories, noise pollution and sunlight. Combining those factors with the concept of a 'Playground' to form the landscape and design the layout of the facilities such as classrooms, canteen, administration buildings etc. Then add in the 'Architectural elements' that were found from the case studies and the important conditions from the literature review research.

Students prefer spaces within a natural environment such as trees, gardens, ponds and outdoor spaces that are not enclosed. Linking to the visual aspect of environment and atmosphere, as students prefer visual interaction while able to relax and cool down their mind while they are focusing on their lesson learnt. This can happened with both indoor space and outdoor space. The flexibility of space is important for students to generate new ideas and have new experiences while they are learning; all this open space can be transformed into learning space. An indoor wall that can change the size of classroom is one factor of flexible space. The boundary of spaces also included in students' selection. Meaning that any spaces that have a sense of separation, both physically and visually can influence a students choice of selection. For example, non-enclosed spaces, spaces around a corner or a space like a podium that extends from the ground. The choice of designing every things in school to a shape of box and square because this shape allow student to play with the architecture of school. It can transform to seating, table, chair, stairs, stage, pathway, optional space, and boundary space any anything that students could imagine. Those functions combined with the natural features of the environment form various kinds of spaces. For example, big spaces that face to green areas, small spaces near water features such as ponds and stair spaces that face soccer fields, etc.

Chapter 5
Lesson Learnt

The objective of this thesis is to establish what kind of spaces and architectural elements attract students into creating learning spaces for themselves. As a solution, North Bangkok Demonstration School is designed to support contemporary ways of learning.

In order to understand students' behavior in forming learning space, literature on learning space was reviewed. Studies on the standard course curricular were explored to understand how to form basic structure of school's curricular to support the need of students. Moreover, research on design trends which included law and regulations concerning the well-being of students, classrooms which translate into the demonstration school design, putting emphasis on the contemporary ways of learning. Literature on specific topics of different kinds of 'learning spaces' were reviewed to find a research gap, the architectural elements of learning space (stair, circulation, pathway, etc.) and to understand more about the important factors on learning space preferences for students.

In addition, observations of three existing schools were completed to understand factors of space selection to be incorporated into the demonstration school design. However, the limitation is making the analysis harder than it should be. The observations needs to be conducted among children which is often prohibited by the teachers as they are afraid it could interrupt their time. Also, it is difficult to interview children as they can be shy or scared to talk with people they don't know. After interviewing the staff to point out the student preferred spaces, the key finding are focused on outdoor spaces such as green spaces, water features, open spaces, open floor plans and others element that can define boundaries.

As for the project's site selection, the existing site is planned to build North Bangkok Demonstration School in the area of North Bangkok University. The site is near public transportation lines and the main road to provide convenient transport options for people who want to visit the site. The location of the site is also in a neighborhood where there is no existing demonstration school.

The North Bangkok Demonstration School for primary level in Phathumthani destrict is designed, informed by the literature reviews and case studies. The school is a one floor school that is separated into many cells. The school has a large building footprint to be able to provide contemporary learning space as much as it needed.

Most schools in Thailand follow the guideline of school design that require building to the maximum without caring about contemporary learning space. For example, the old fashioned classrooms that are stacked together, with a poor atmosphere and lacking green spaces that students can visually and physically interact with. The wasted corridors for circulation that cannot be spaces to hang out or gather together before going into the classrooms. In this demonstration school, design will encourage free space and interaction between students, teachers and nature to form new ideas of school.

The school landscape design is intended to represent a playground to create different kinds of space for students to sit in and interact with friends according to the concept of contemporary learning space. The architect has to design spaces to be friendly, warm and welcoming atmosphere like home so students would feel relaxed and enjoy spending time in the various spaces.

The roof of the building is designed with a gable to represent a homely concept. Classrooms are open plan and flexible enough for both teachers and students to adapt to difference activities. The large classrooms windows encourage the idea of interacting

with nature outside. Yet, the spaces for outdoor learning and every classroom are connected to each other the entire school is on one floor.

To conclude, the design of North Bangkok Demonstration School aims to create opportunities for students to select their preferred learning spaces and to build a school with significant outdoor aspects in accordance with the concept of contemporary learning space.

Suggestion

This thesis would benefit from more time to study the behavior of people and how they use spaces. If it possible, interviewing student would be the best way to find the preferences of students when selecting spaces. The more answer from student, the more advantage student will gained from the space. Another area that need to touch on is informal learning space. From literature review above, no one can concluded what is really informal learning space. If this area of study is investigate and research more. It will benefit to how to design the contemporary learning space.

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APPENDICES

APPENDIX A

Primary School Education

The Basic Education Core Curriculum Act B.E. 2551 directly aim to improve quality of school to produce qualified skillful learners and promote Thai schools to be one of the most leading schools in the world. The educational board was set up to monitor and regulate the school system and set the standard for the school. Evaluation system was implement in every school to reduce the flaws in the system. The basic education needs to be provided to all Thai children. Students are required to acquire the essential knowledge and skills to adapt to the consistency change in the society and be able to acquire knowledge for continuous lifelong self-development.

Vision

The Basic Education Core Curriculum is aimed at enhancing capacity of all learners, who constitute the major force of the country, so as to attain balanced development in all respects physical strength, knowledge and morality. They will fully realize their commitment and responsibilities as Thai citizens as well as members of the world community. Adhering to a democratic form of government under constitutional monarchy, they will be endowed with basic knowledge and essential skills and favorable attitude towards further education, livelihood and lifelong learning. The learner-centered approach is therefore strongly advocated, based on the conviction that all are capable of learning and self-development to their highest potentiality.

Principles

Notable principles underlying the Basic Education Core Curriculum are as follow.

1. The ultimate aim is attainment of national unity; learning standards and goals are therefore set with a view to enabling the children and youths to acquire knowledge, skills, attitude and morality to serve as a foundation for Thai-ness and universal values.

2. The curriculum facilitates education for all, who have equal access to education of high quality.

3. The curriculum facilitates decentralization of authority by allowing society to participate in educational provision, which suits prevailing situations and serves local needs.

4. Structure of the curriculum enjoys flexibility regarding learning contents, time allotment and learning management.

5. The learner-centered approach is strongly advocated.

6. The curriculum is intended for education of all types- formal, non-formal and informal, covering all target groups and facilitating transfer of learning outcomes and experiences.

Goals

The Basic Education Core Curriculum is aimed at the full development of learners in all respect—morality, wisdom, happiness and potentiality for further education and livelihood. The following goals have consequently been set for achievement upon completing basic education:

1. Morality, ethics, desirable values, self-esteem, self-discipline, observance of Buddhist teachings or those of one's faith, and guiding principles of Sufficiency Economy;

2. Knowledge and skills for communication, thinking, problem-solving, technological know-how, and life skills;

3. Good physical and mental health, hygiene, and preference for physical exercise;

4. Awareness of responsibilities and commitment as Thai citizens and members of the world community, and adherence to a democratic way of life and form of government under constitutional monarchy; and

5. Awareness of the need to preserve all aspect of Thai culture and Thai wisdom, protection and conservation of the environment, and public-mindedness with dedication to public service for peaceful and harmonious co-existence.

Learners' Key Competencies

The Basic Education Core Curriculum is aimed at inculcating among learners the following five key competencies:

1. Communication Capacity

Capacity to receive and transmit information; linguistic ability and skills in expressing one's thoughts, knowledge and understanding, feelings and opinions for exchanging information and experience, which will be beneficial to oneself and society; negotiation for solving or reducing problems and conflicts; ability to distinguish and choose whether to receive or avoid information through proper reasoning and sound judgment; and ability to choose efficient methods of communication, bearing in mind possible negative effects on oneself and society.

2. Thinking Capacity

Capacity for analytical, synthetic, constructive, critical and systematic thinking which lead to creation of bodies of knowledge or information for judicious decision-making regarding oneself and society.

3. Problem-Solving Capacity

Capacity to properly eliminate problems and obstacles, based on sound reasoning, moral principles and accurate information; appreciation of relationships and changes in various social situations; ability to seek and apply knowledge to prevent and solve problems; and ability for judicious decision-making, bearing in mind possible negative effects on oneself, society and the environment.

4. Capacity for Applying Life Skills

Capacity for applying various processes in daily life; self-learning; continuous learning; working; and social harmony through strengthening of happy interpersonal relationships; elimination of problems and conflicts through proper means; ability for self-adjustment to keep pace with social and environmental changes; and capacity for avoiding undesirable behavior with adverse effects on oneself and others.

5. Capacity for Technological Application

Ability to choose and apply different technologies; skills in application of technological processes for development of oneself and society in regard to learning, communication, working and problem-solving through constructive, proper, appropriate and ethical means.

Desirable Characteristics

The Basic Education Core Curriculum focuses on learners' development for attainment of the following desirable characteristics, enabling learners to enjoy a life of harmony among others as Thai citizens and global citizens:

1. Love of nation, religion and King
2. Honesty and integrity
3. Self-discipline
4. Avidity for learning
5. Observance of principles of Sufficiency Economy Philosophy in one's way of life
6. Dedication and commitment to work
7. Cherishing Thai-ness
8. Public-mindedness

Learning Standards

Observance of the principles of development of the brain and multiple intelligences is required to achieve learners' balances development. The Basic Education Core Curriculum has therefore prescribed the following eight learning areas:

1. Thai Language
2. Mathematics
3. Science
4. Social Studies, Religion and Culture
5. Health and Physical Education
6. Arts
7. Occupations and Technology
8. Foreign Languages.

APPENDIX B

Demonstration School Education

Vision

Lifelong learning vision for education innovation in second decade (2009-2018) assigned the key set, “Everyone will have learning quality thought out their life” (Department of Education, 2014) by focusing on 3 factors;

1. Learning and education improvement
2. Opening chance of education
3. The corroboration from every sector in society

The quality of education and learning need to reach 4 quality factors;

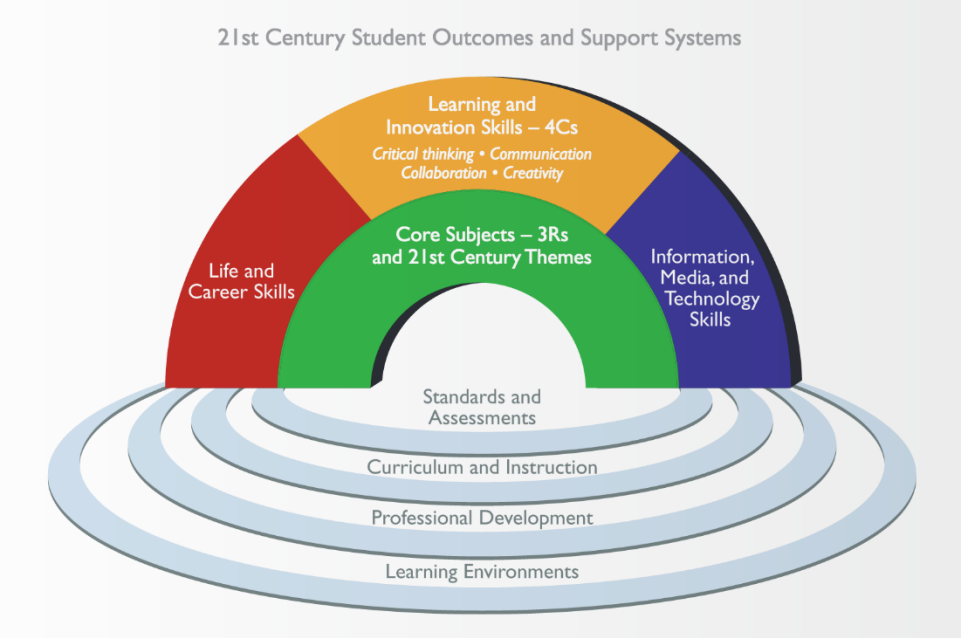
1. Quality of future citizen
2. Quality of future teacher
3. Quality of future learning space and educational place
4. Quality of future managing

Moreover, according to Framework for 21st Century Learning of Partnership for 21st Century Skills, requires the development of core academic subject knowledge and understanding among all students. Within the context of core knowledge instruction, student will learn the essential skills for success in today’s world, such as critical thinking, problem solving, communication and collaboration. Student’s core subjects in 21st Century themes include English, reading or language arts, world languages, arts, mathematics, economics, science, geography, history, government and civics.

In addition, schools promote an understanding of academic content at much higher levels by interpolate 21st century interdisciplinary themes into core subject:

- Global Awareness
- Financial, Economic, Business and Entrepreneurial Literacy
- Civic Literacy
- Health Literacy
- Environment Literacy

The Educational Innovation Skills



Source: The Partnership for 21st Century Skills, 2000, www.P2l.org

The book of Bernie Trilling & Charles Fadel, 21st Century Skills: Learning for Life in Our Times (2009) come up with the seven skills that need to push in 21st century skill, follow by;

1. Skill of critical thinking and problem solving
2. Skill of communications, information and media literacy
3. Skill of collaboration, teamwork and leadership
4. Skill of creativity and innovation

5. Skill of computing and ICT literacy

6. Skill of career and learning self-reliance

7. Skill of cross-culture understanding

In order to form innovation skill for the 21st century education, teacher need to change their teaching style. “Teach less, Learn more” (Sripunkulkajorn, 2012) by providing activities fro children. Teachers need to ask themselves what children will learn from activity that they provide. On the other word, teachers no need to guide children to follow their ways of learning but let the children find their own way which each students would have different ways of learning, this called PBL (Project-Based Learning) (Department of Education, 2014).

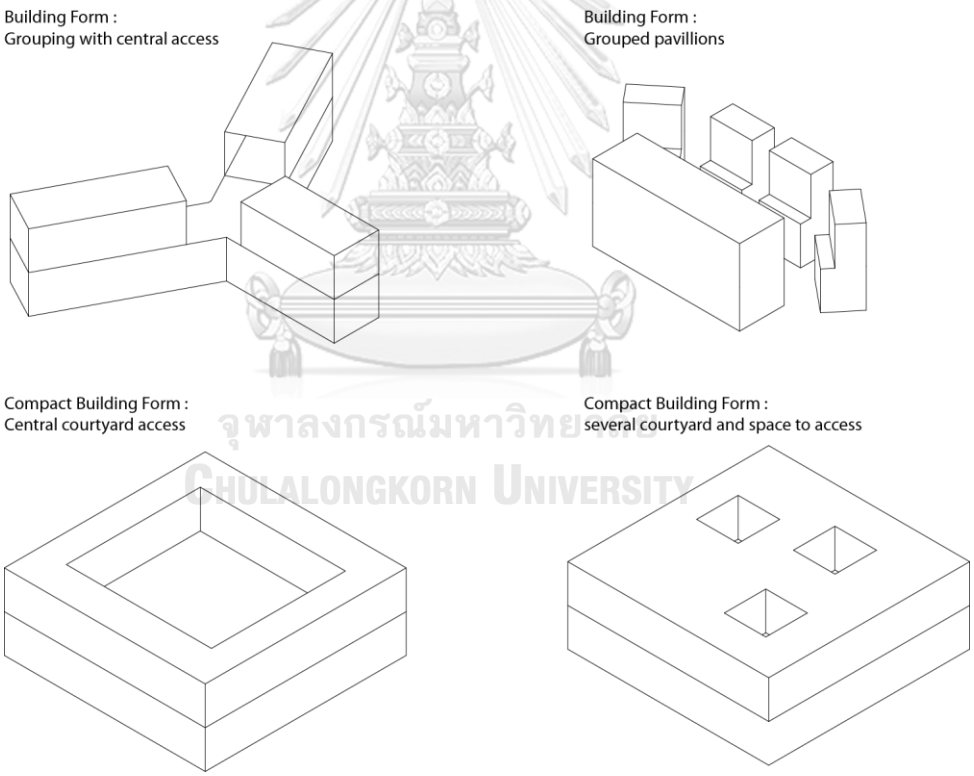
According from the new innovation skill, teacher will be called as coach. Also the old fashion of learning style, teacher will encourage student to student and work individually to prove that those students really gain certain knowledge. However in a new style of learning, learning as a group is a selected choice. Leading to change in classroom arrangement and way of learning. For example, change from regular classroom to studio, so students can always work and share their experience together. Meaning that it affects the way of learning as lecture based to project based also.

APPENDIX C

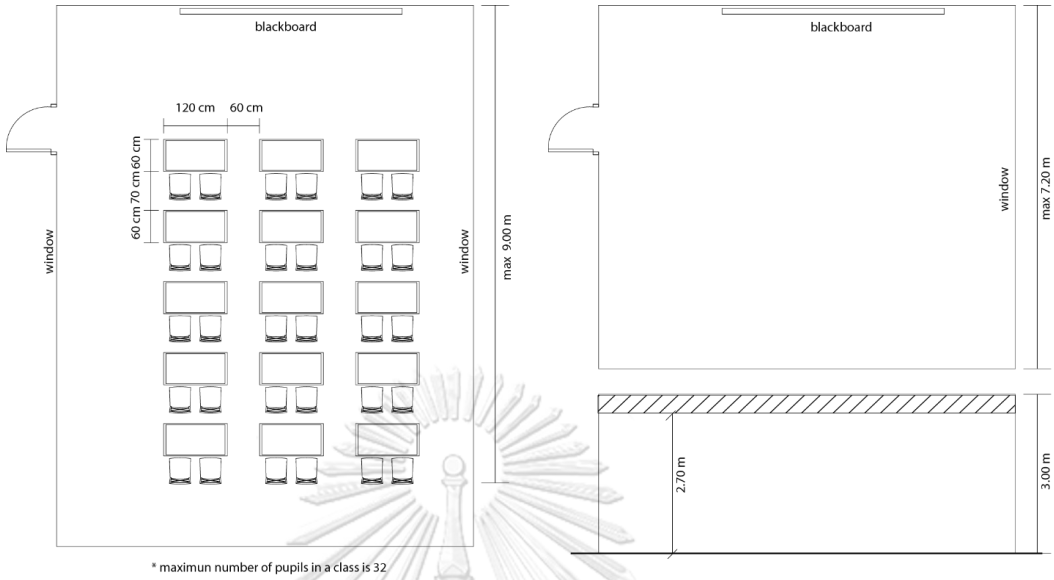
Primary School Standard Dimensions

This primary school standard dimensions is gathered from Neufert Architect Data by Ernst Neufert, from Third and Forth Edition. This two edition were analyzed into importance point that related to school design. The following instructions were guided to design North Bangkok Demonstration School.

1. Building layout



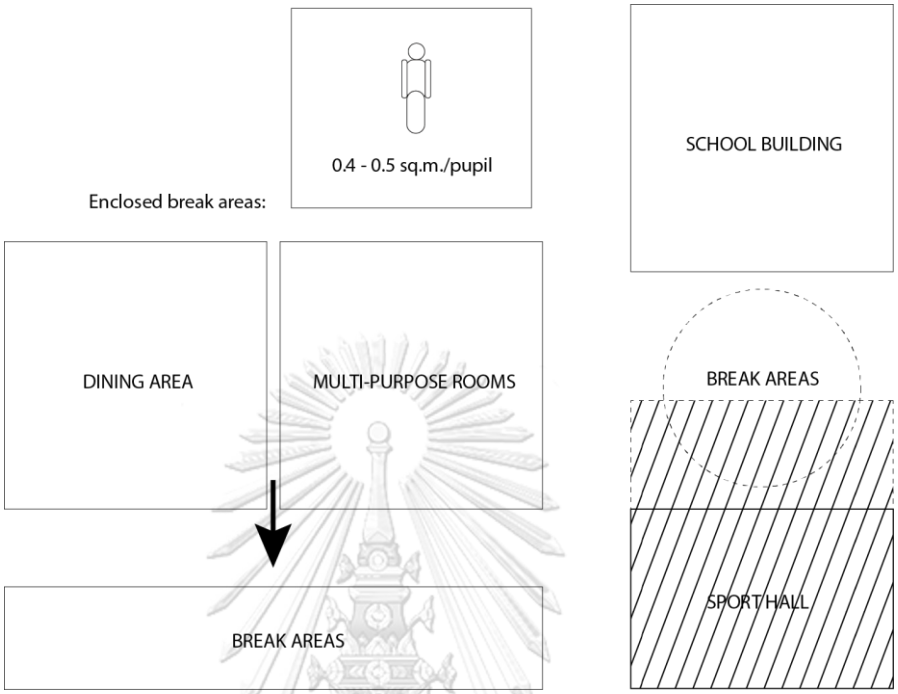
2. Classroom space



* maximun number of pupils in a class is 32

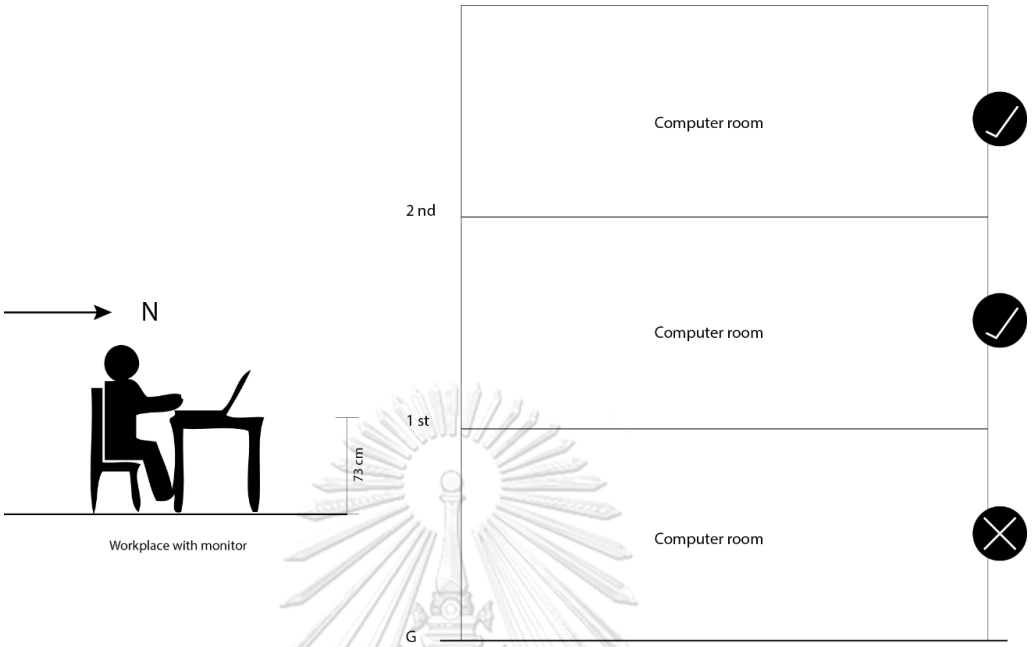
3. School stories

4. Break areas

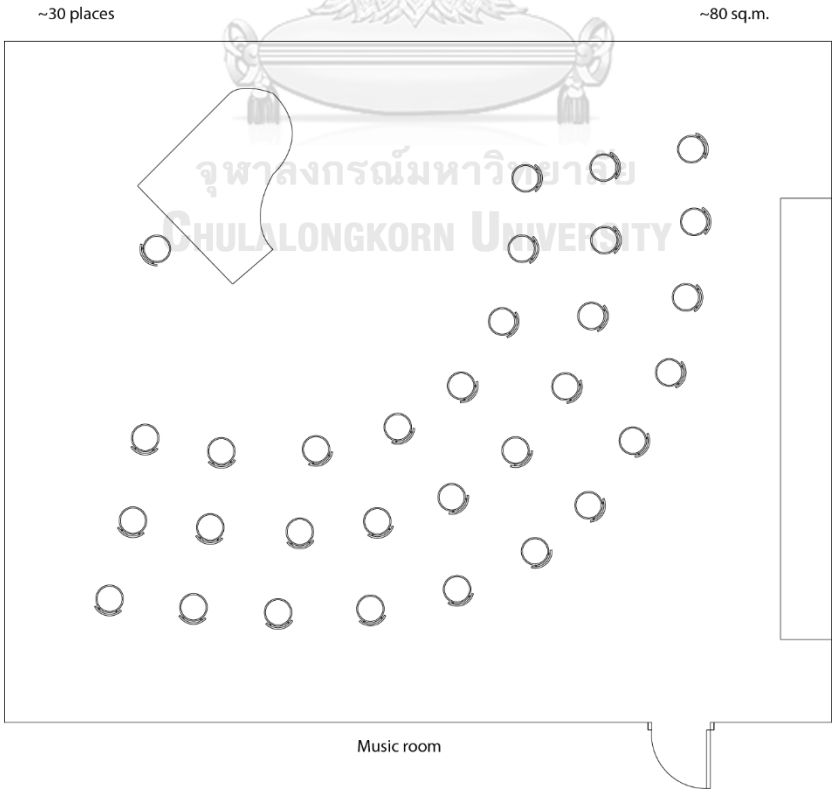


5. Communal area

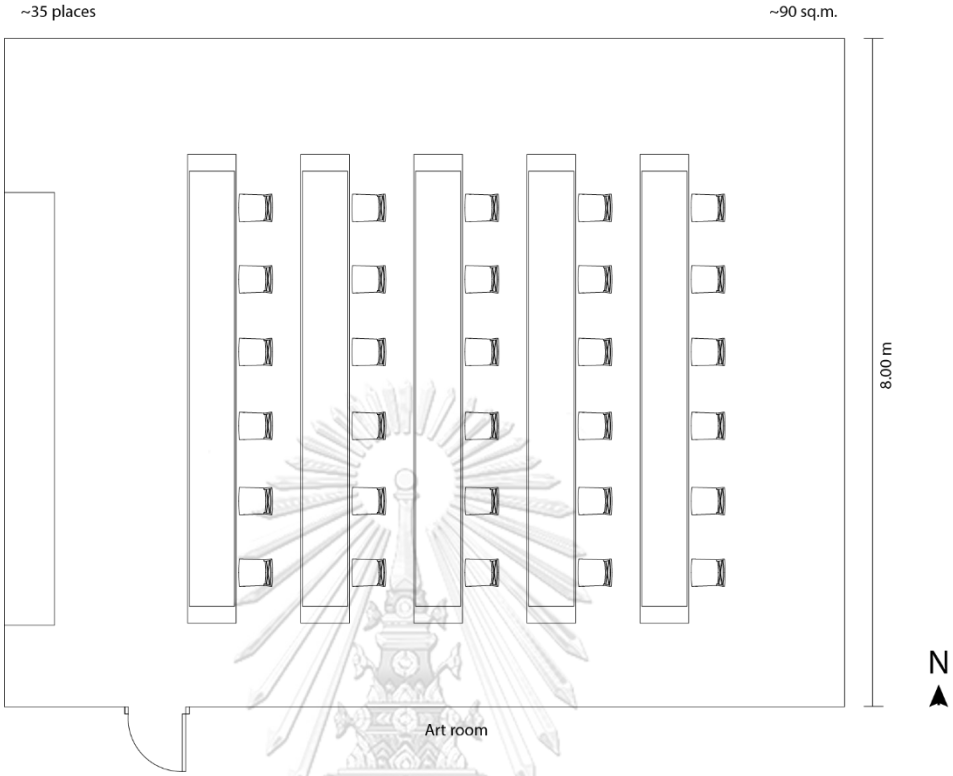
6. Computer room



7. Music room

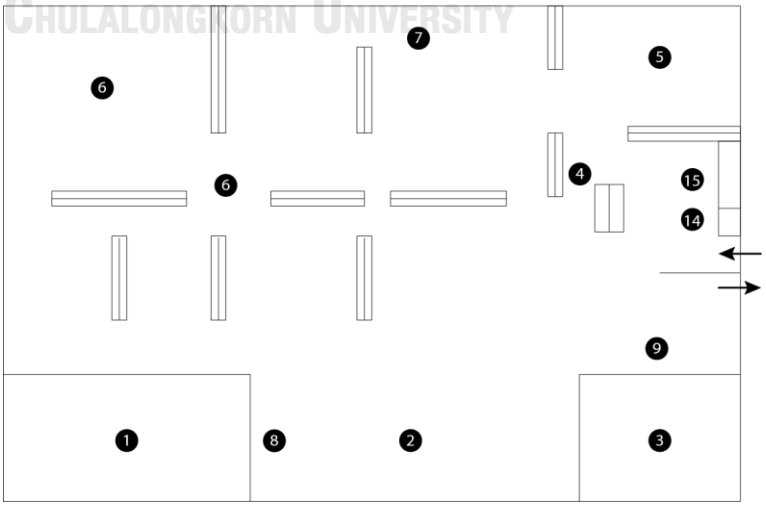


8. Art room

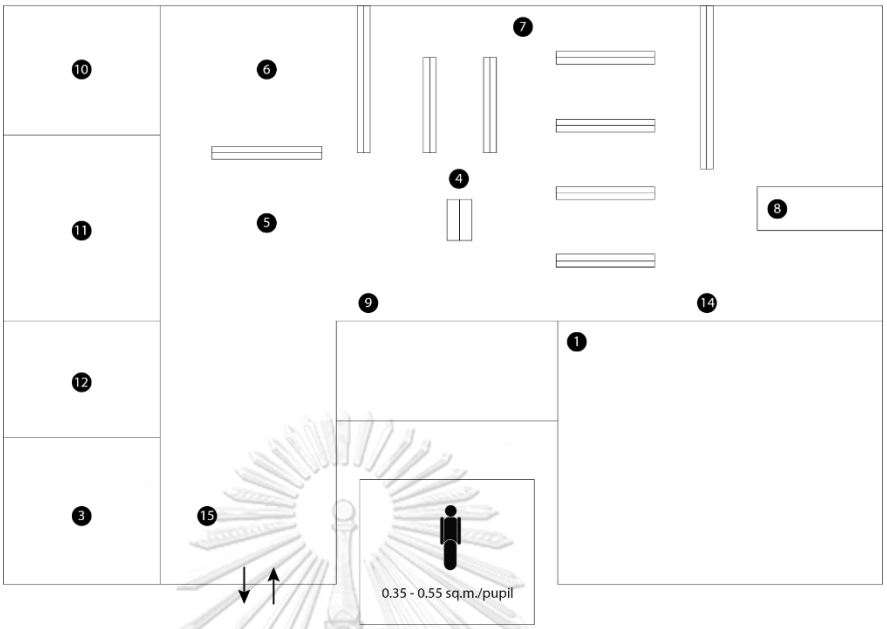


9. School library and media center

EXAMPLE NO.1
The arrangment of school library and media center

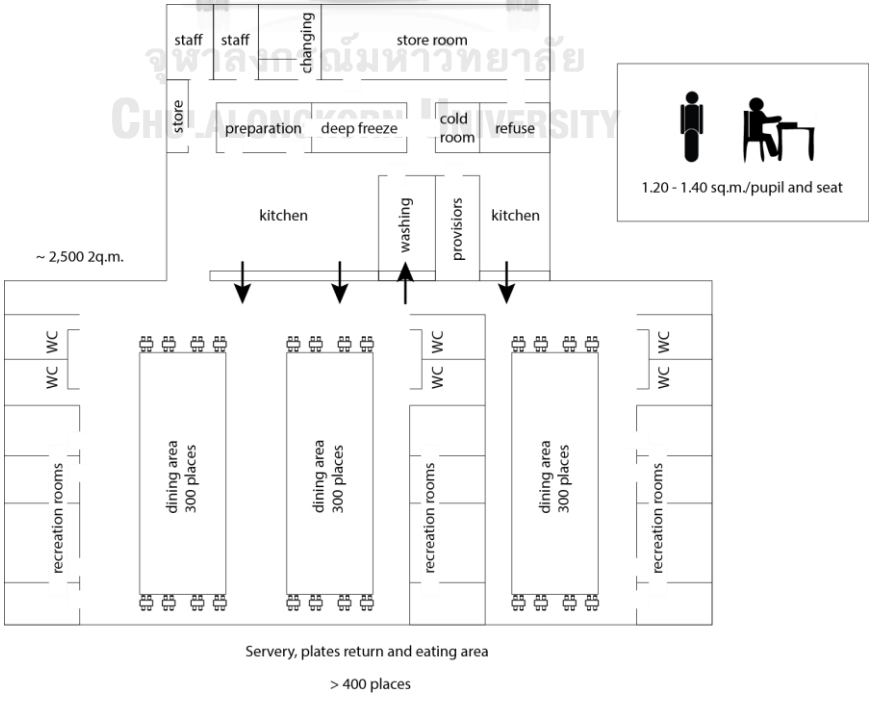


EXAMPLE NO.2

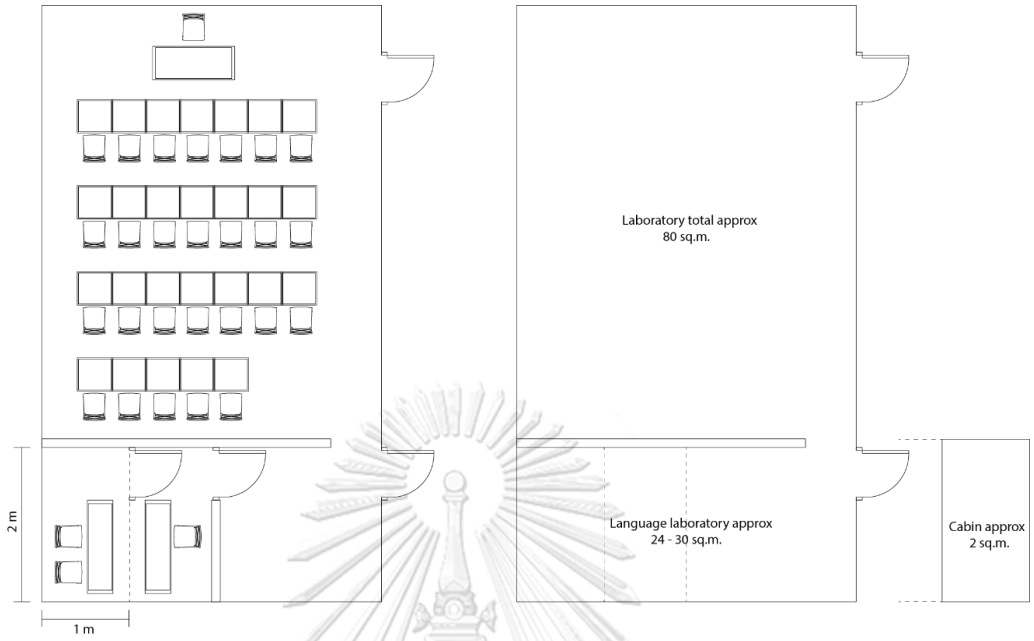


1. Multi- purpose room
2. Audio booths
3. Office
4. Central catalogue
5. Newspaper/ Magazine
6. Group area
7. Individual places
8. Typing booths
9. Information/ Lending desk
10. Lecture desk
11. Audiovis/ Studio
12. Racks
13. Free access
14. Photocopies
15. Cloakroom/ Lockers

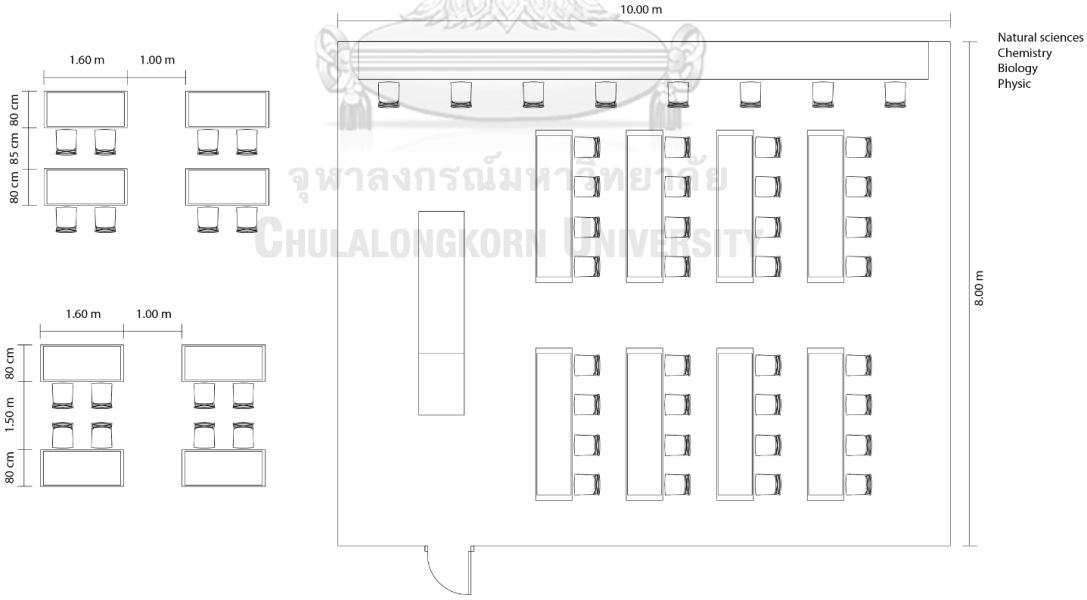
10. Canteen



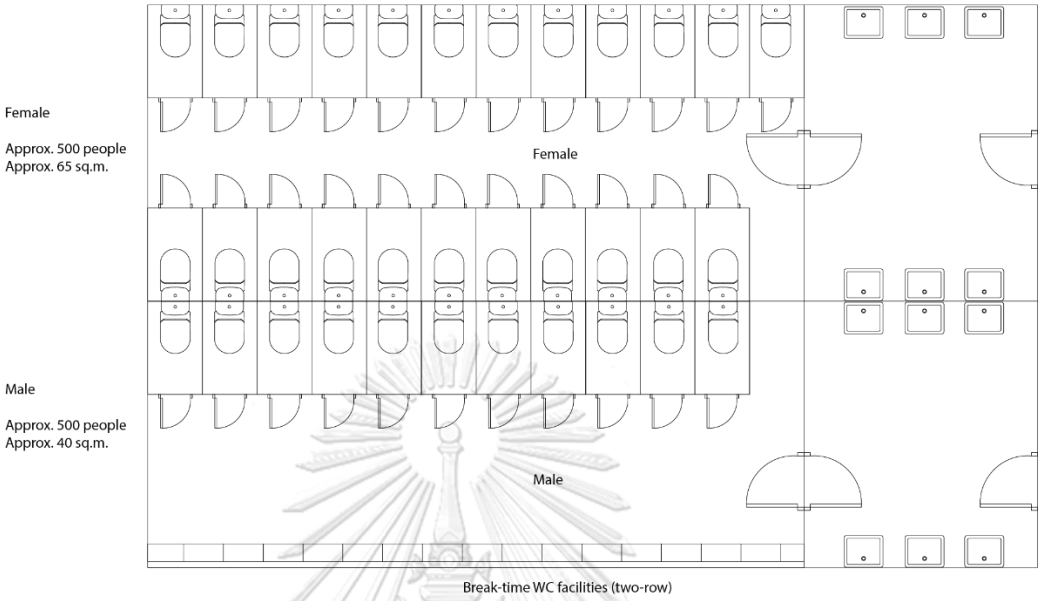
11. Language laboratory



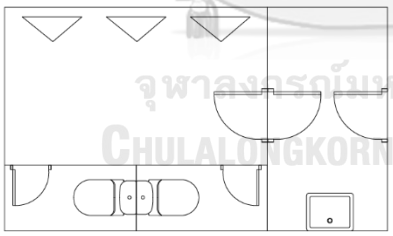
12. Science room



13. Toilet

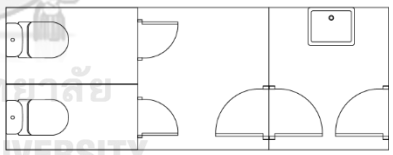


Teacher WC facilities



Male and Female

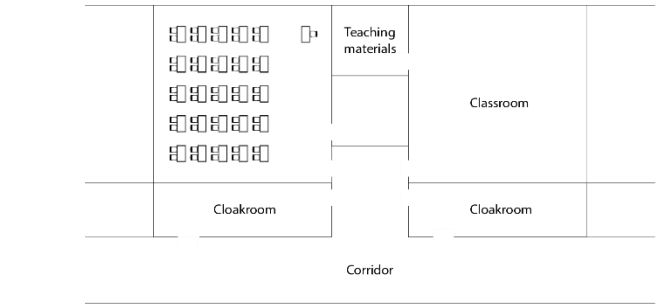
Approx. 30 people
Approx. 15 sq.m.

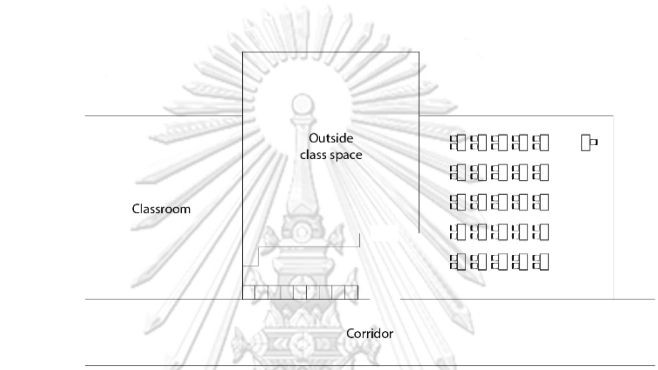


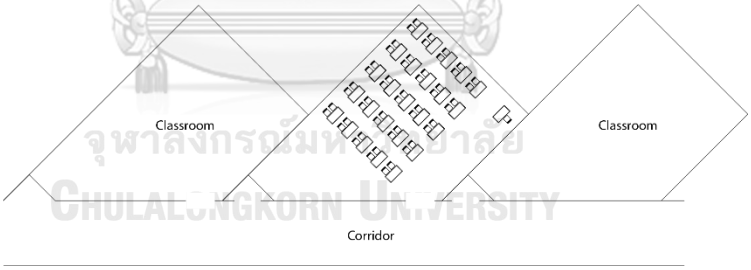
Female

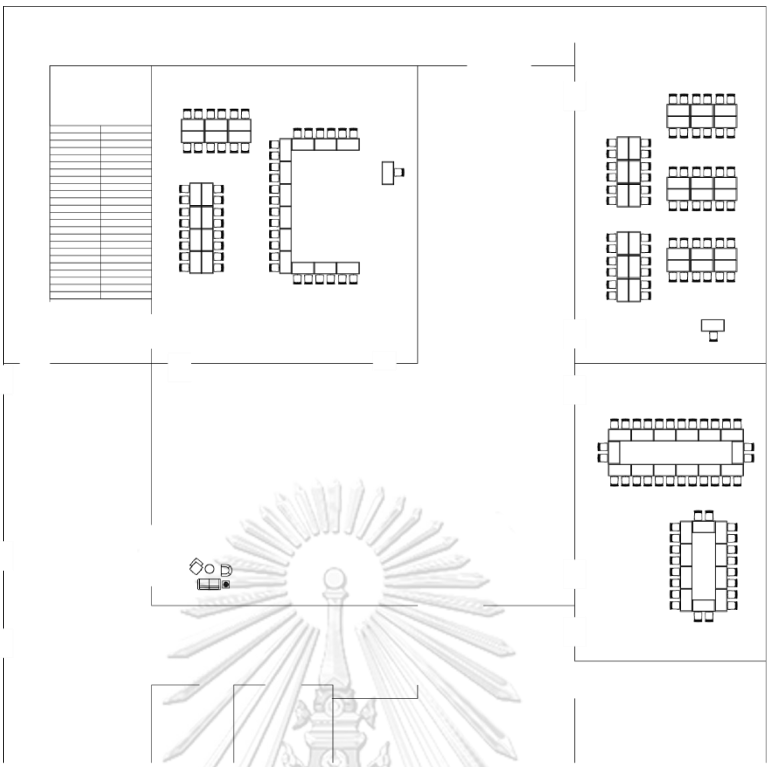
Approx. 20 people
Approx. 10 sq.m.

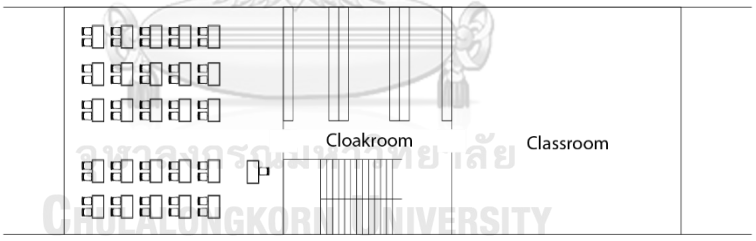
14. Arrangement of classrooms and clusters

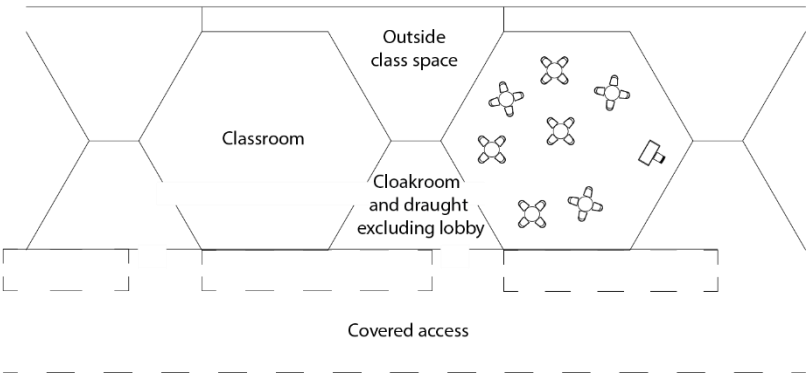


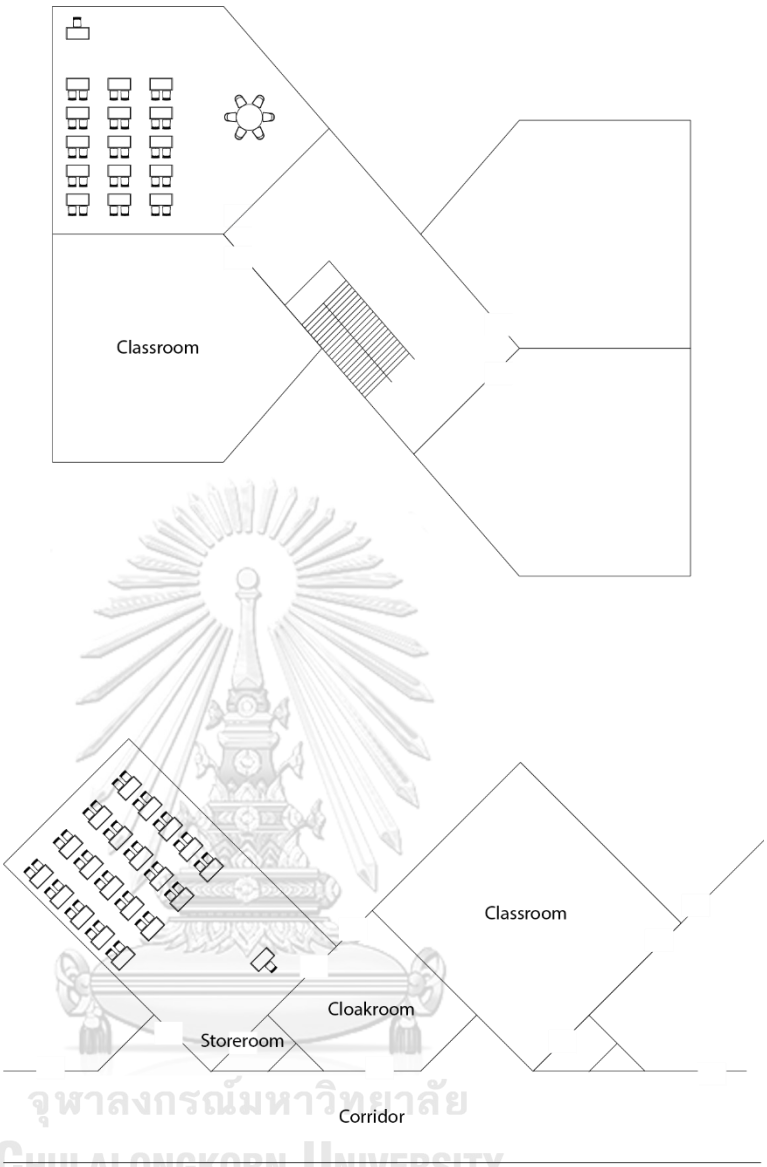


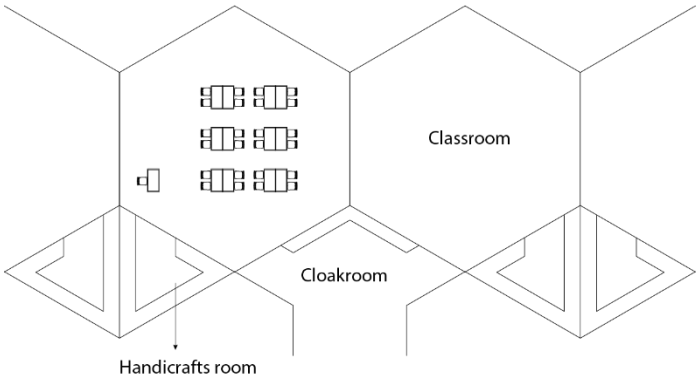


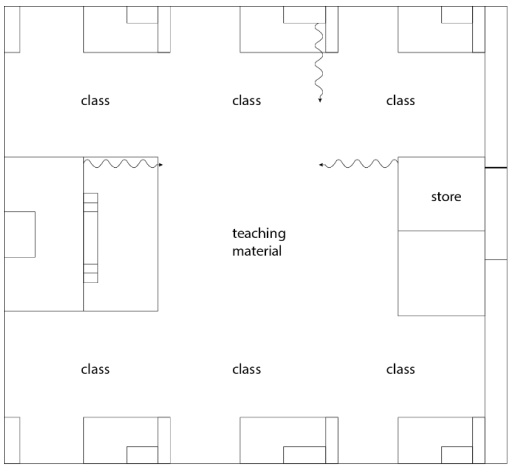




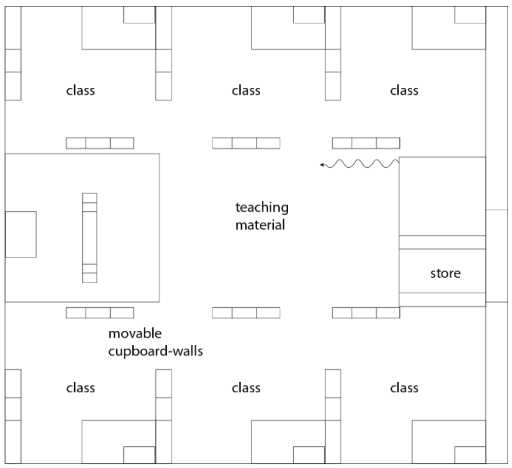




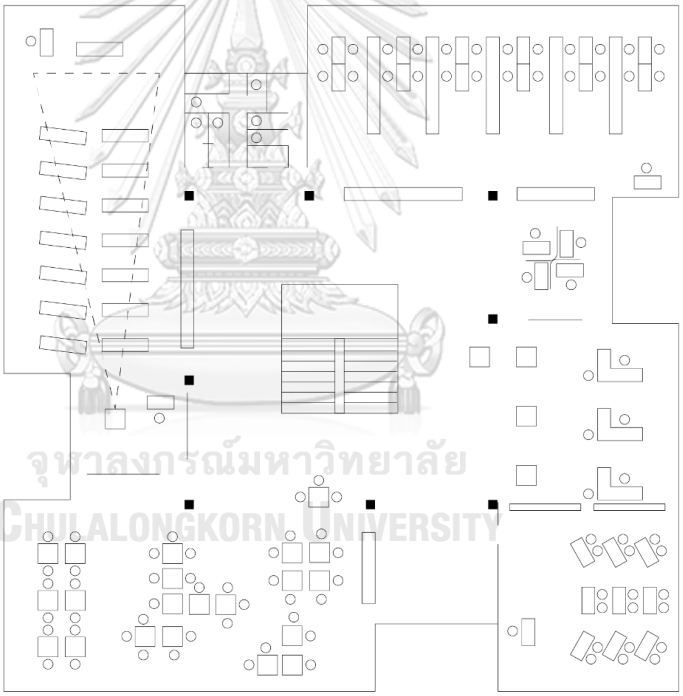




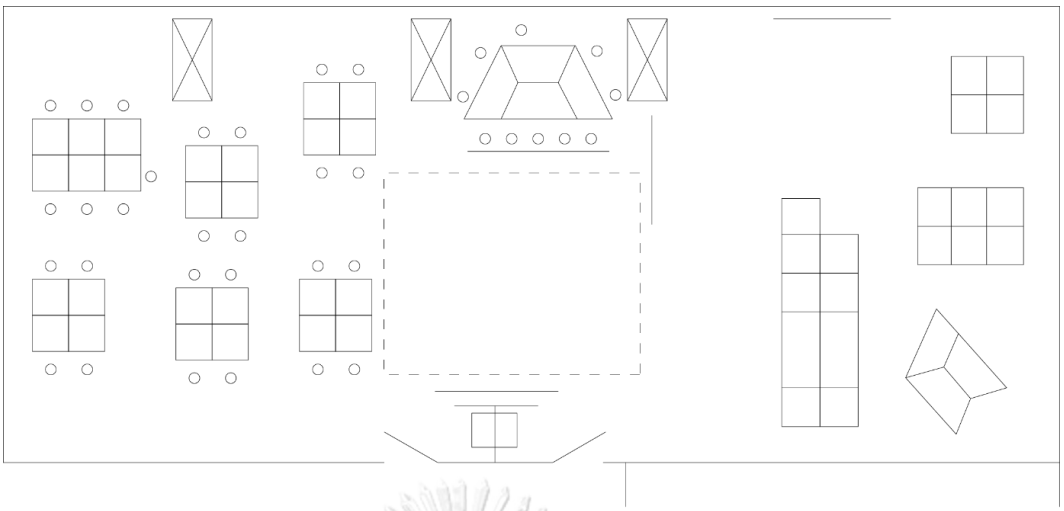
SCHOOL ROOM WITHOUT WALLS



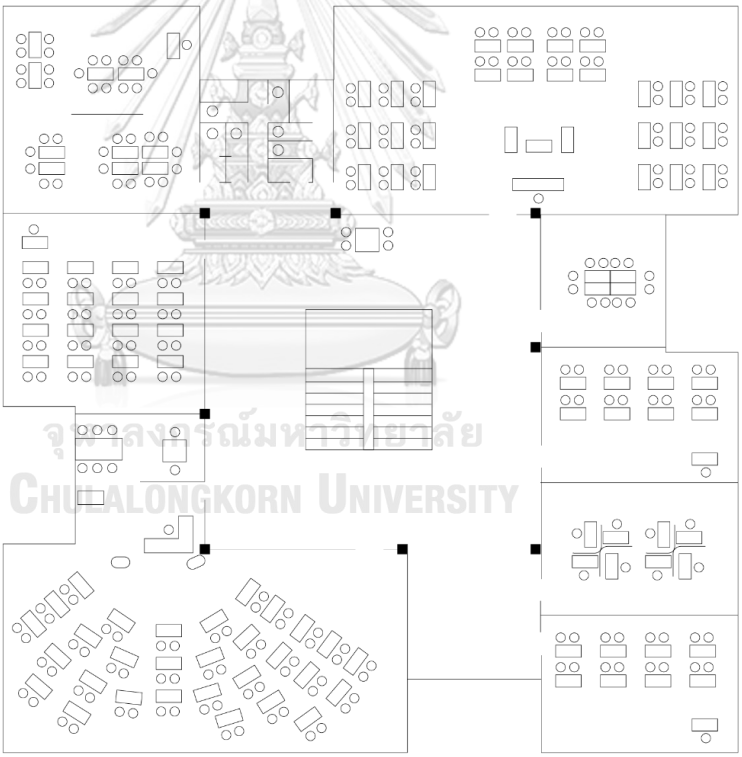
DIVIDED BY MOVABLE CUPBOARD-WALLS



VARIABLE LAYOUT WITH 8 CLASSES

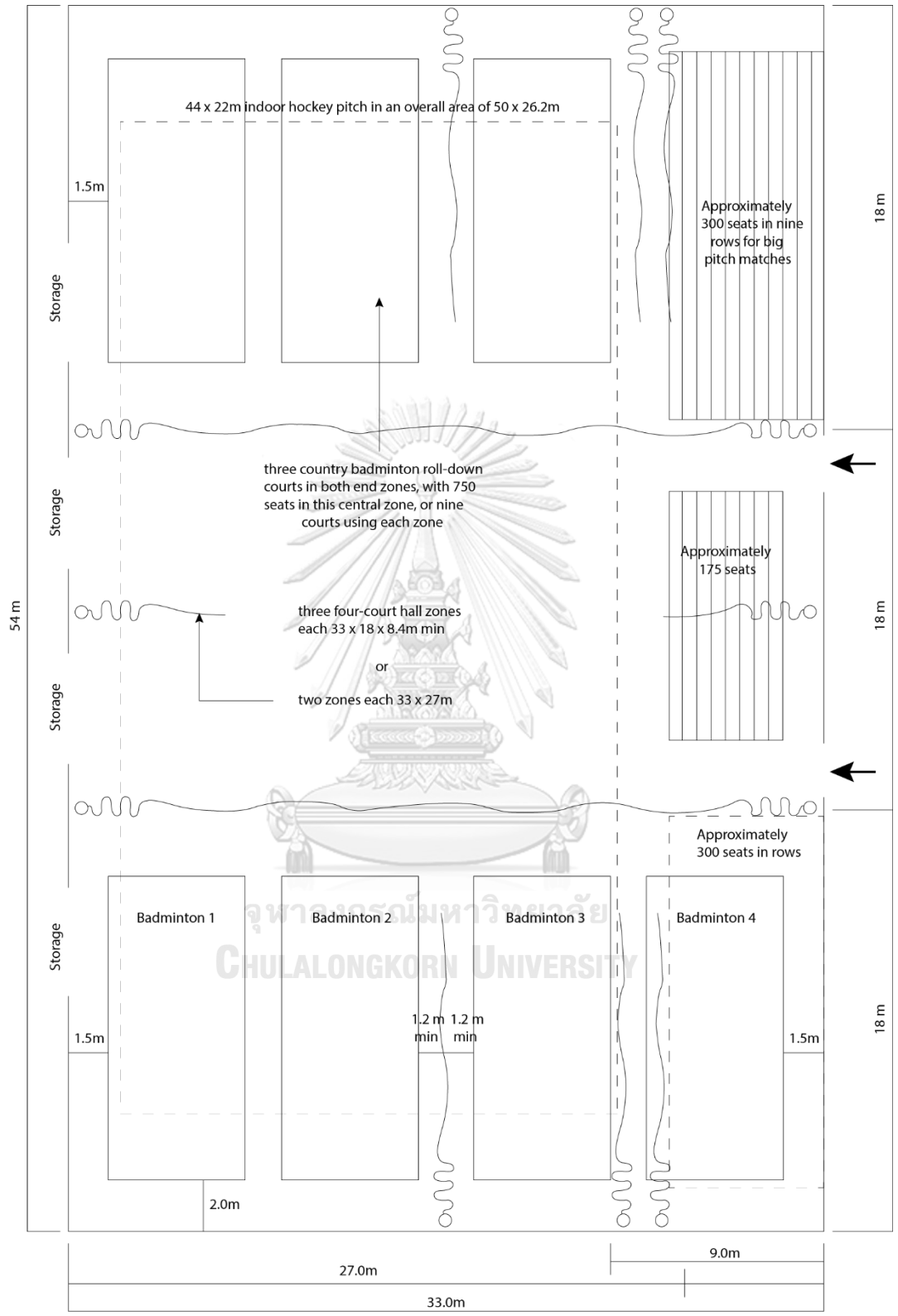


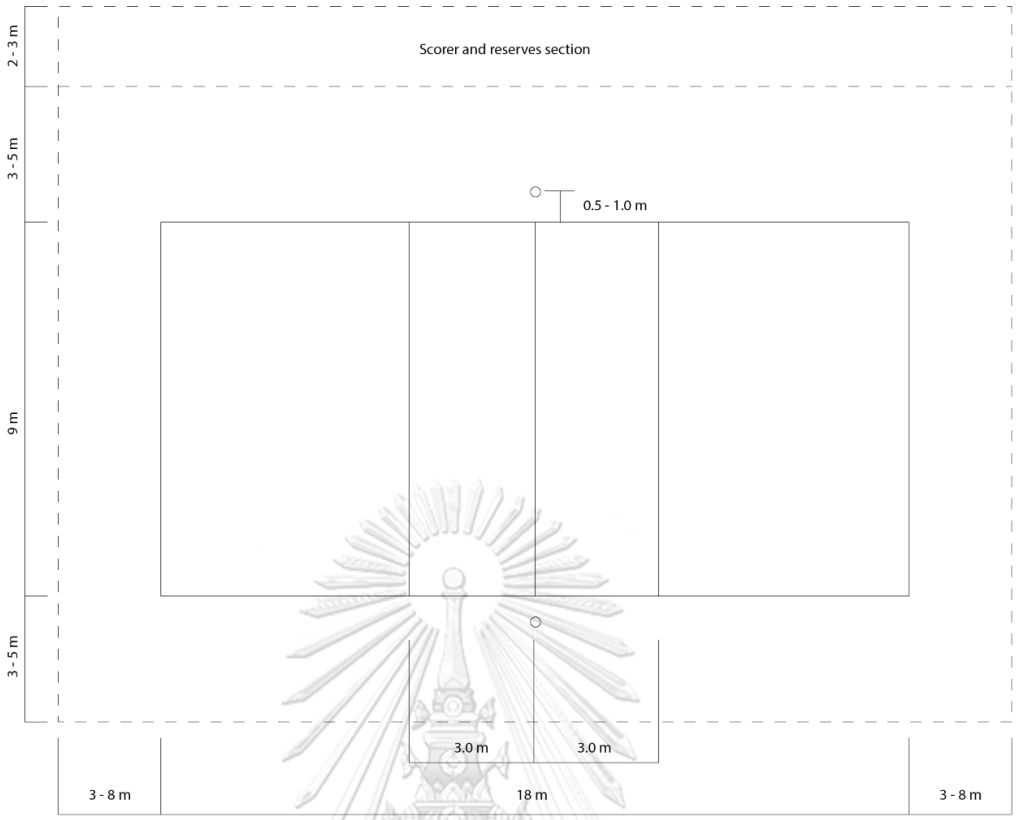
TANNENBERG SCHOOL IN SEEHEIM, PRACTISING TEAM TEACHING



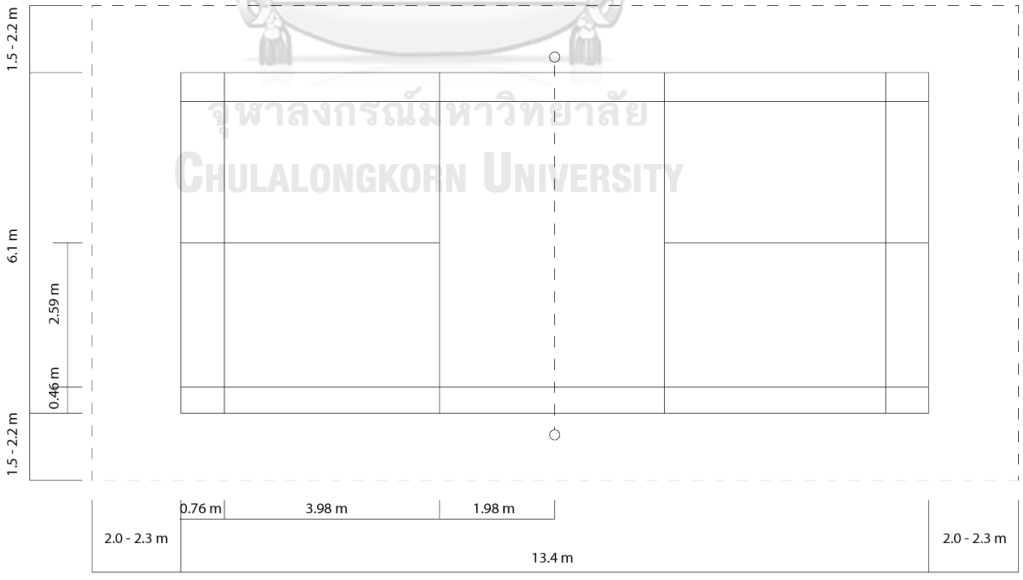
MULTI-PURPOSE AREAS

15. Sport hall

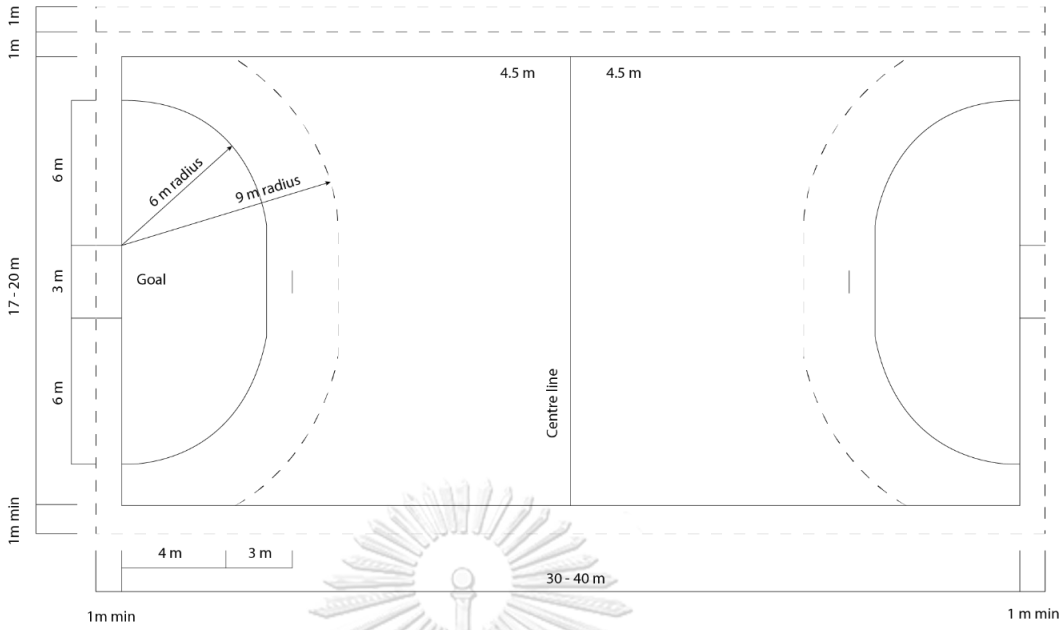




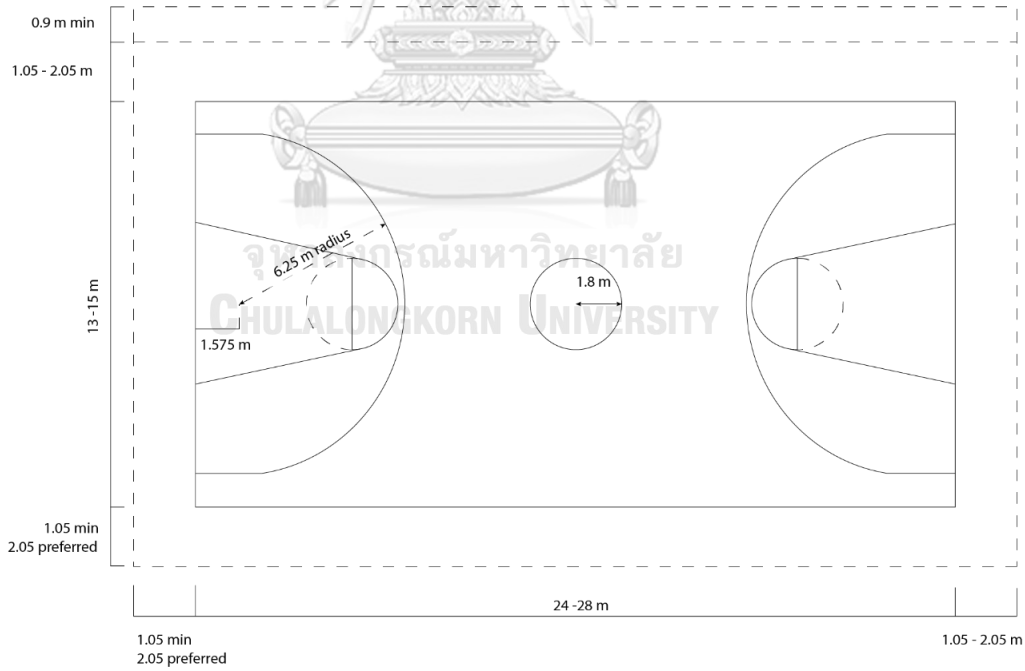
Dimensions of a volleyball court



Dimensions of a badminton court

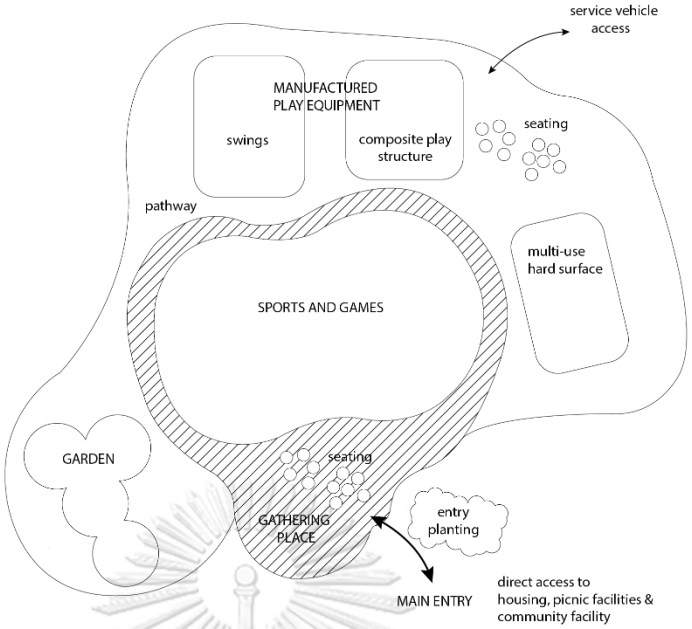


Dimensions of a handball court

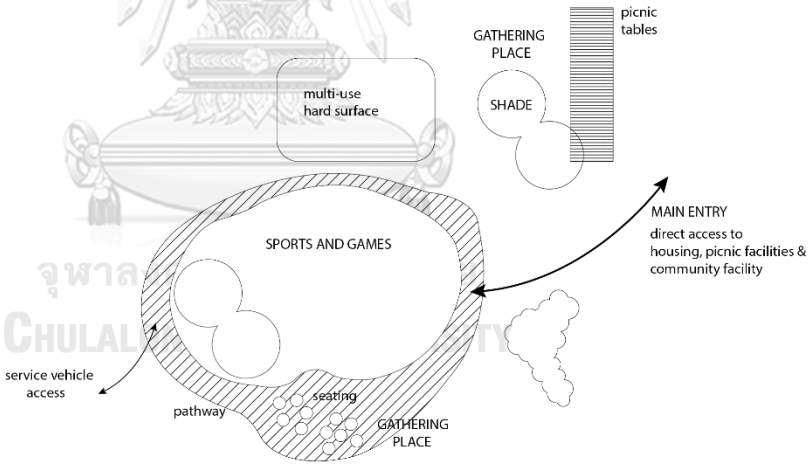


Dimensions of a basketball court

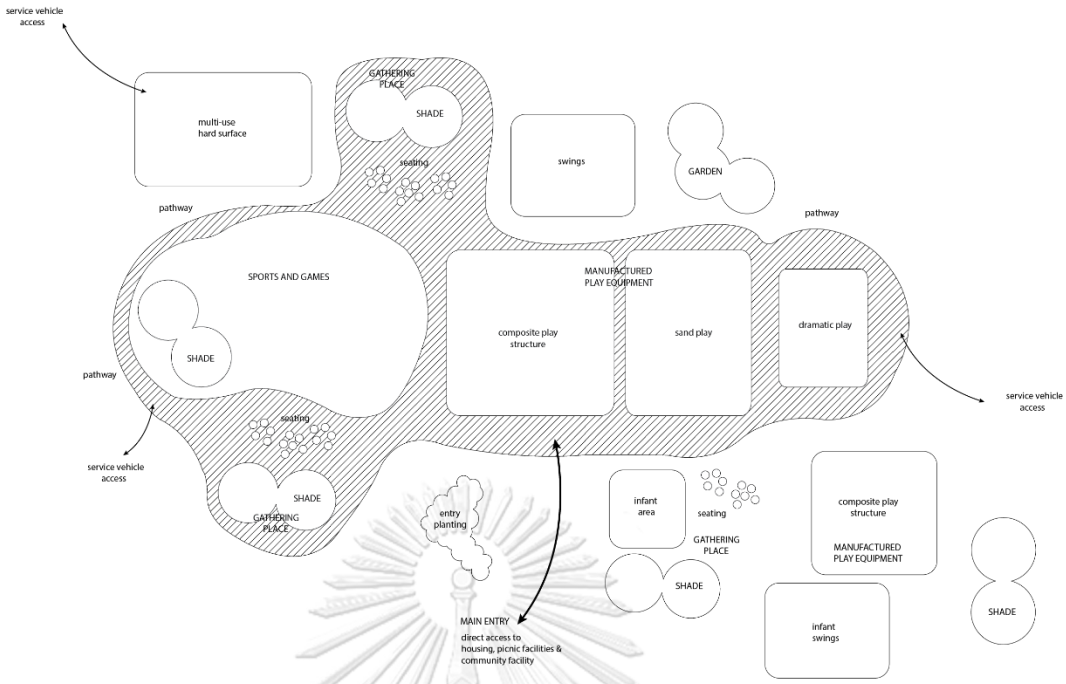
16. Playground



9 to 15 Years



9 to 15 Years



VITA

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In 2014, she received a Bachelor of Science Degree in Architectural Design (International Program) from faculty of Architecture, Chulalongkorn University. She then proceeded to enroll in the Master of Architecture in Architectural Design (International Program) at Chulalongkorn University.

She presented the paper entitled “Contemporary Learning Spaces : North Bangkok Demonstration School.” For a conference called “The 56th Kasetsart University Annual Conference” on January 30 – February 2, 2018, in Bangkok, Thailand.