

Affordance of Garden Towards Restorative Process of Hospitalized Children

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Abstract

This study investigates sense of affordance attained by hospitalized children participating in a pediatric-ward garden during their restoration in hospital. Affordances are the functional meanings generated when children play with the garden features, either alone or with peers. According to ecological perceptual psychology, the affordances are interrelated with stimulation and feedback when the children interact with the garden contents. The functional meanings of the garden can be seen in four different levels of affordances: potential, perceived, utilized and shaped affordances. The affordances generate movement through play and positive perceptual judgments such as attachment, affiliation, memory, bonding and affection toward the garden features. Responses from 31 patients, aged 6-12 years, are elicited by semi-structured interview. It is found that 84% (n=26) patients perceived and utilized the affordances of play equipment. However, less number of patients (52%; n=16) perceived the plant as significant element of the garden. This perception suggests the affordances of the play equipment are greater than the plant. Moreover, all patients recognized the affordances of microclimatic factors (rain, sunlight, temperature and wind). Thus through play participation with the garden elements afford the patients to increase their cognitive performances, improve performance tasks (i.e. play) and increased social performances. In healthcare delivery, these improvements are considered restoration. This seems to suggest that garden is an environmental intervention in affording hospitalized children to foster health recovery.

Introduction

When children are sent to hospital to restore their health, they are transferring from a familiar setting, the home, to a strange (unfamiliar) one, the hospital. The home setting affords them with physical elements to play or interact leading them to get affection and affiliation with the environment (Proshansky and Fabian 1987). From the interaction, the children attain affection and affiliation through visual perception (Heft, 1999) as well as physical contact resulting to feedbacks and affordances (Wohlwill and Heft 1987). “In the view of ecological perceptual psychology, the perception is fundamentally goal oriented, which means that perception cannot be separated from the intentional activity with which it is connected” (Kytta 2003). Children movement (mobility) in an outdoor space reveals a lot of significant information about the environment. Therefore, perception is an active experience in which one finds information through mobility (Kytta 2003).

Free to move means freedom to play that allows the children to have their own control on themselves (Olds 1989). Having control affords a child to locate himself freely in space, assume body postures, create own boundaries, have access to diverse territories, manifest power, and explore his abilities (Olds, 1989). And by moving in moderate manner generates comfort and varied levels of stimulation for the children’s senses (Olds 1987). Such movement allows the children to make predictions and helps maintain optimal levels of responsivity and alertness (Olds, 1989, 1987). In addition, having control to move in their own choice and pace generates self-regulation leading to feeling of being relaxed, calm and comfort (Korpela 2002). The feeling is recognized as psychological well-being (Rubin et al., 1998).

Apart from physical and cognitive interactions with the environment, a child playing with peers or adults is a social transaction that extends the meaning of the physical environment many different meanings (Ladd 1999). For example, when a child rides a spring-rider he gets a feedback such as fascination and satisfaction. Moreover, when he takes turn to ride the equipment with a peer that transactions include not only the physical play but also resulting to communication and negotiation. As a result, the transaction generates further affection to the physical environment (Kellert 2002).

However, in most hospitals, regulated biomedical procedures and hospital environmental conditions limit the movement of young patients (Copper Marcus and Barnes 1999). They receive little privacy and are confined to their beds with little

interaction with peers such as siblings and other patients. As a result hospitalization often erodes the feelings of toddlers and young children leading to stress (Lau 2002) which result to reduced cognitive performance, helplessness, restlessness, crying, anxiety, and elevated blood pressure (Lindheim et al. 1972; Lau 2002). Eventually, the children react regressively such as excessive fears, anxiety, increased clinging to and dependence on parents, or low esteem ((Johnson 1994; Lau 2002). In landscape architecture perspective, having the hospitalized children experience the outdoor environment such as healing gardens allow the children to gain control by allowing them to move (Copper Marcus and Barnes 1999; Moore 1999). In children term, experiencing the garden means play. Through play their senses are stimulated by the garden contents: play equipment, vegetations, animals and micro-climatic factors (sunlight, temperature, rain, and wind) (Moore 1999). They would gain positive feedback, for example, climbing a tree allows him to see beyond his height that may lead to satisfaction (Moore 1996). Or playing with a peer generates communication and acquaintanceship (Hartle and Johnson 1993; Ladd 1999). Through the play, division between sensory and motoric activity disappears (Kytta, 2003).

Interaction and transaction with the outdoor afford the children to gain psychological well-being which may include feeling of calm and comfort, clear minds, being relaxed, forgetting worries, evoke feelings of well-being, reflection and self-regulation (Rubin et al. 1998; Korpela 2002). According to ecological perceptual psychology, these restorative qualities are generated because the children move in the garden space and thus perceive its functional meanings (significances) (Korpela et al. 2002).

In recent years J.J. Gibson's theory of affordances (1979) has been used to examine the relationship between functional properties of the environment and how environments are used (Clark and Uzzell, 2002). According to Kytta (2003) affordances are the "functionally significant properties of the environment that are perceived through active detection of information." She further posits that affordances include properties from both the environment and the acting individual. The affordances are always unique and different for each individual and each specific group of people" (Kytta, 2003). For instance, Heft (1999) posits an object that smaller than the hand-span of a child, for example, a twig, is perceived by the child to be graspable, that is, it affords grasping. The twig also affords the child to throw it away, to scratch the ground, to dig sand, and so on. Thus the twig, as an environmental

feature, has multiple functional significances understood by the child through experiencing the environment. Kyttä (2002) categorizes 10 types of environmental qualities that support affordances: flat, relatively smooth surfaces; relatively smooth slopes; graspable/detached objects; attached objects; non-rigid, attached object; climbable feature; shelter; moldable material (dirt, sand, snow); water; and affordances for sociality. For example, graspable/detached objects affords throwing, digging, building of structures, playing with animals, and using plants in play (Kyttä 2002).

The aim of this paper is to present an analysis of affordance of a pediatric-ward garden in a Malaysian hospital for 6-12-year old patients. Two specific research questions dealt with here are:

1. What are the affordances—potential, perceived, utilized and shaped— of the play equipment, vegetation and microclimate available in the garden?
2. Do experiencing the garden increased the physical and cognitive functioning of the hospitalized children leading to restoration?

The study is based on the casual relationship between the patients with the garden. Inasmuch, the garden is affecting the behavior of the patients, either progressively or regressively. It is anticipated that the patients would experience some progressive behaviors due to affordances of the garden as a place for them to get away from the ward conditions.

Methodology

Garden

The garden is composed of eight play zones and equipped with 32 play equipment or garden accessories placed on lawns or sand pits. The play zones are: Area A—Mars rope play; Area B—Triangular rope play; Area C—Alphabetical walk; Area D—Pavilion and spring-rider; Area E—Pavilion and swing; Area F—Overturned urn; Area G—fishpond and pergola; and Area H—Patio (see Figure 1). Area D has the most number of play equipment with chatterbox, four spring-riders on sand pit, spiral slide, hopscotch, and shovel. It also equipped with a pavilion and bordered by verdant foliage and flowering shrubs and two immature trees. The garden

design is based on Robin C. Moore (1999) children healing garden design guidelines (pp. 370-382).

In perspective of childhood development, the garden is a playground ((Moore 1999) with plenty of play equipments and surrounded by a variety of tropical plants. It is located beside the pediatric ward of Batu Pahat Hospital in Malaysia. Thus the patients can view the garden through glass-louvered windows from their beds. It is at same level as the ward that eases the patients to reach it. In term of floor area, the garden is slightly bigger than the ward. Overall, the greenery of the garden is composed of verdant tropical plants: a mature tree, palms, flowering and foliage shrubs and lawn as groundcover. The plants articulate the space to locate the play equipment including spiral slide, timber ladder and swing, spring-riders, hopscotch, chatterboxes, shovel, balancing bar, rope play structures, overturned urn, and treasure chests. In addition, there two timber pavilions, a fishpond with timber deck and eight benches distributed throughout the garden for caregivers to rest.

Subjects

The ward has 24 beds administering acutely ill infants, toddlers and young children. The study examines 6-12-year-old patients (n=31) playing in the garden on individual interview. More than 65% of the patients came from rural areas whose are familiar with greenery and animals. The patients have short length of stay, an average 3.1 days. The interview was conducted to those patients who have participated in the garden for at least a day. The recommended period of play is 5.5 hours during the daytime.

Measures

Affordances of the garden were investigated by using semi-structured interview. The interview was designed to determine what the garden offers the patients in a physical, cognitive and social senses. It is conducted in the garden during the daytime from 9:00 a.m. to 5:30 p.m. for eight weeks, from mid-January to mid-March, 2004.

Before the interview, the researcher (first author) begins the process by doing maintenance works such as watering the plant, weeding, pruning, replenish sand into pit, rake and remove fallen leaves and other debris, feeding fish and sweeping debris on walkway. These actions help to build the children's rapport and thrust to the

research in order to get their attention and elicit their responses effectively (Graue and Walsh 1995). The walkway is the major circulation system that links all the play zones except Area F. The researcher then placed a tape recorder, digital camera, A-4 size garden plan and questionnaires on one of the pavilions. Permission was sought from the caregivers, mostly mothers, for the interview. During the interview the patient was given to hold the tape recorder to engage them in the interview. Since children have a short attention span (Graue and Hatch, 1993), a patient was made to listen to his/her recorded voice. All of the patients were excited listening to their own voices. At times, the patients were allowed to play with the equipment and the interview was resumed after he/she had enough playing with it. Therefore, the interview was conducted according to the children's terms and context; a phenomenological approach (Seamon 2000).

The interview, comprising of 42 questions and 33 different affordances, was developed on the basis of Kyatta (2003) functional taxonomy of the children's outdoor environments. Table 1 shows the affordances included in the interview. After some general questions on the patients' personal data and landscape of their homes, the children were presented with a list of questions concerning environmental affordances. Four examples of the individual questions are:

1. Which features that you like to play first?
2. What makes you attracted to the features?
 shape
 color
 function
3. Do you like the plants in the garden?
 Yes, Why?
 No, What equipment that you like to add?
4. Do you like to play in the garden when it rains? Why?

Different answers to the questions reflect varying levels of affordances, namely the potential, perceived, used and shaped affordances.

Statistical and Content Analyses

The interviewed data were analyzed by using two methods: (1) percentage of preference for garden features (play equipment and plants), and (2) analyzing patients' words toward the garden. Preference is a perceptual judgment of a patient liking a feature more than for another (Reber and Reber 2001). In other words, the patient is showing his choice trigger by the affordances of the feature (Kyttä, 2003). Analyzing the words is to elucidate patterns or regularities from the patients' behavioral responses (Patton 2002). Thus the words are functional meanings of the garden or its features to the patients.

Results

The behavioral responses of the patients (n=31) toward the affordances of the garden are categorized into three types: (1) affordances of play equipment as non-rigid attached objects, (2) affordances of plants and animals, and (3) affordances of microclimate. Four different levels of affordances—potential, perceived, utilized and shaped affordances are determined.

Affordances of play equipment

From the 32 equipment, 74% (n=23) of the patients selected manipulables to play. In ranking order the percentage of equipment first play by the patients was: shovel (39%), slide (26%), swing (13%), bucket swing (13%), chatterbox (6%), and Mars rope structure (3%). Moreover, 39% (n=12) connoted the shovel with their own words including 'plough' (n=4), 'digging machine' (n=3), 'KOBE' (a manufacturer brand of backhoe) (n=1), 'JCV' (another manufacturer brand of backhoe), 'hoe' (n=3), 'kutek-kutek' (sound when a person played the shovel) (n=1). The first five words connote to the excavating function of the shovel in which the patients can scoop sand with the shovel by moving its arms. For example, a 12-year old boy called the shovel as KOBE because he often seen mechanical backhoe excavating drainage channel in his village. The manufacturer brand of the backhoe is either KOBE or JVC. The last word signifies the sound produce when the shovel is being used. It was mentioned by an 11-year boy that he was attracted to go to the garden after hearing the sound of the shovel when someone was playing on it. Moreover, a timber trolley is associated to the shovel because a patient dumps the excavated sand into it with the

help of a peer (patient or sibling). This is a cooperative play that affords a patient the patient to communicate, make turn-taking and negotiate with a peer (Ladd, 1999).

Furthermore, 90% (n=28) of the patients played with the equipment because of their functions. And 51% (n=15) have chosen similar equipment that they had played first and would like to have it at their homes. The equipment were shovel, swing and slide. Moreover, 84% (n=26) selected the first equipment to play in Area D which has the most number of manipulating equipment for the children to play.

Overall, 84% (n=26) patients perceived the play equipment as significant element of the garden. In addition to the above responses, the patients give additional reasons why they preferred the equipment including: (1) I like to play with the equipment, (2) Without the equipment there will be nothing to play with, (3) Without the equipment the garden will be a boring place, (4) The equipment beautifies the garden, and (5) I simply like the swing.

Affordances of plants

Fifty-two percent (n=16) of the patients preferred the plants as the significant element of the garden. They mentioned several reasons including: (1) The plants provide shade and cool the garden, (2) The tree provides space for them to play underneath it, (3) The plants make the garden beautiful, (4) They can play hide-and-seek behind the plants, (5) Without the plants the garden would be a boring place, (6) The plants provide food for butterflies, (7) They can find jumping spiders hiding in the plants, and (8) There will no animals coming to the garden without the plants. Therefore, the patients recognized three levels of affordances from the plants: perceived, utilized and shaped affordances. The plants afford shading, cooling effect, providing beauty, hiding, providing food and habitat to animal, and searching and catching spiders.

Affordances of microclimate

Four microclimatic factors are analyzed, rain, sunlight, wind, and temperature. Eighty-one percent (n=25) would no play in the garden when it rain and the common reason was that they afraid of getting sick. They mentioned that their parents told them that playing in the rain would make them sick. Specifically, all asthmatic patients disliked playing in the garden when it rains. However, 7% (n=4) liked to play in the rain because they would enjoy playing and would like to take bath in the rain.

All patients (n=31) recognized the presence of shadow cast on the ground when a tree, palms or play equipment blocked the sunlight. And they also recognized the absence of shadow when clouds overcastted the garden. However, only 39% (n=12) of them correctly identified a matured tree has the biggest shadow. Thus the affordance of the sunlight is recognizing the presence or absence of garden elements.

In regard to temperature, the patients responded to the tropical warm temperature in a mixture of sensual feelings. Twenty-nine percent (n=9) of them did mind to play through out the day, 35% (n=11) preferred to play in late afternoon, 13% (n=4) preferred to play only in the morning, 10% (n=3) preferred to play either in the morning or late afternoon. Therefore, 58% (n=18) recognized the affordances of the cooling ambience of the garden in the morning or late afternoon. However, 35% recognized the warm temperature is favorable for them to play in the garden through out the day.

Finally, all patients recognized the presence of wind when it blew over them. Sixty-five percent (n=20) said they felt comfort when the wind blew over their bodies. Their sensitivity to the wind was recognized in the following words: (1) I feel the winds and it cools me, (2) I feel the wind and I like it, (3) the wind in the garden is stronger than the one in the ward, (4) the wind in the garden is fresher and cooler than the one in the ward, (5) I prefer the wind in the garden than the one in the ward, (6) I feel the wind when I run, and (7) I see the leaves move when blown by the wind.

Discussion

The first question of the study was on what are the affordances of the play equipment, vegetation and microclimate that stimulate the patients' sense and trigger behavioral responses. Majority of the patients selected manipulating play equipment because of the function of the manipulables rather than their colors and shapes. This perceptual judgment is consistent with the finding of (Fjortoft and Sageie 2000) that children perceive the garden feature not towards their forms but rather towards their functions. The play equipment affords the patients with two levels of affordances: perceived and utilized affordances. For example, before playing a shovel, a patient perceived its function as a play tool. Then he rides on it, moves its arms, scoops the sand, and finally, dumps the sand into a trolley—utilized affordances. Thus the shovel

affords riding, grasping, scooping, and dumping. According to Heft's (1999) and Kytta's (2003) taxonomies of affordances, the shovel is a graspable/detached object that perceived and utilized by the patient as a manipulable. Preference for manipulating object is a normal cognitive functioning for mid-childhood children (Olds, 1987). It is an active play affording the patients to be fascinated and attains satisfaction (Heft 1999). Moreover, the shovel affords some patients to recall their memories to equipment with similar function that they see at their home setting. Memories and place attachment are children's cognitive functioning toward the environment (Yates 2002). Therefore, playing with the shovel generates two behavioral responses, mobility and increased cognitive performances. These positive responses, in the perspective of environmental psychophysiology, are recognized as restorative benefits (Hartig and Staats, 2003).

Moving from an equipment to another or from one play area to another is a direct perceptual cognition—knowledge of environment (Gibson, 1979 cited in Kytta, 2003). The motion and perceptual cognition increased the patients' cognitive and physical functioning because through motion they able to locate themselves freely in the garden, establish different body postures, have access to diverse play areas, manifest their powers, and explore their abilities (Olds, 1989). Such functioning is very limited in the ward due to limited space and regulated medical procedures (Lindheim et al., 1972; Lau, 2002). Relating these behavioural responses with the second question, it is clear that the equipment affords the patients to improve their performance tasks (i.e. play) and increase their cognitive performances (i.e. perception).

Playing with the play equipment also affords the socialization, for example, coordination between the shovel's player and the trolley's player. According to Kytta (2003) the social play afford role playing and being noisy. In childhood psychology, such play is essential element for the cognitive, physical and social development of the children (McDevitt and Ormrod 2002).

In comparison to plants, the patients perceived the play equipment affords more functional meanings. This judgement suggests the patients perceived the equipment as play tools whereas the plants are considered as compliment to the spatial composition of the garden. However, they also recognized the potential affordances of the plants including providing shade by blocking the sunlight and thus creating cool ambience in the garden. In addition, they perceived the plants creating

beauty to the garden, and without the plants the garden would be a boring place. Thus there is a sense of affiliation towards when the patients move around and look at them. This is the concept of ecological perceptual psychology and consistent to a Gibson's (1979, cited in Kytta, 2003) views: "We must perceive to be able to move around, and we must move around to able to perceive" (p. 30). According to Kahn (2002), affiliation towards plants is positive cognitive development for children. And the emotional feeling towards plants is an innate tendency for human being to affiliate with natural things (Verbeek and de Waal 2002). Another increased cognitive functioning experienced by the patients is the ability to associate the plants with animals, spiders and butterflies. They recognized the plants providing food and shelter to the animals. This cognition suggests the patients, whom most come from rural (village) settings, able to recall (a memory) the association of plants and animals. Such positive response is strong in middle childhood (Cobb 1969) suggesting a positive shift in the cognitive functioning of the patients (Hartig and Staats 2003). In summary, the perceived affordances of plants are shading, ameliorating temperature, creating beauty, and providing food and shelter for animals.

All patients are stimulated by the potential, perceived and used affordances of the microclimatic factors of the garden. Most recognized the negative impact of playing in the rain; the rain affords getting sick. However, some perceived its potential for playing and taking bath.. Therefore, the affordances of the rain are making them sick, playing and bathing. These mixed responses suggest the patients responsivity including cognition towards the rain is strong.

Likewise, all the patients possessed strong responsivity to the sunlight that stimulates their sensual feeling to understand form or shape of the garden elements (Olds, 1989). Intensity of sunlight is directly related to the temperature (heat) of the day. Most patients able to sense the heat and thus prefer to play in the morning and late afternoon when the temperature is more comforting for play. Thus the sunlight enables the patients to understand the passage of time and estimate the time of day (Olds, 1989). Therefore, the sunlight affords viewing the garden, feeling the passage of time, estimating time, and configuring the garden as play space.

Finally, all patients are stimulated by the presence of the wind. The perceived affordances of the wind include cooling, comforting, refreshing, and differentiating its strength. Two used affordances of the wind observed by the patients are feeling wind through running and shaking foliage of plant.

Conclusion

The hospitalized children recognized the pediatric-ward garden as a playspace for them to get away from the confinement of the ward to an outdoor setting with plenty of play tools and natural elements. As a space for playing, the perceived and used affordances of play equipment are more significant than the plants or micro-climatic factors. Therefore, the garden is an environment for the hospitalized children to play that allows the children to have sense of control and freedom of movement.

Moreover, the affordances of manipulating equipment (non-rigid attached features) are more than rigid, attached ones. Thus it is appropriate to place more manipulating play features in children's hospital garden for the patients to fascinate and satisfy leading to increased in physical and cognitive performances. Despite plant has small number of used affordances, the children recognized some of its potential affordances such as creating beauty and cooling the atmosphere of the garden. Therefore, the plant is a component to the composition of the garden, without it the garden is incomplete.

Mobility and perception of patients in the garden have improved their increased their cognition and physical functioning relative to their performances in the ward. Therefore, the garden helps in the restorative process of the patients. It seems clear that having the hospitalized children experiencing an outdoor environment can foster their restoration. Thus having a garden beside a pediatric ward in a hospital is an environmental intervention for children health recovery.

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Table 1: A functional taxonomy of affordances used in the study (cf. Kyttä, 2002)

Categories used in pediatric-ward garden at Batu Pahat Hospital, Malaysia	Affordances
Non-rigid attached objects: Play equipment	Affords crawling Affords grasping Affords swinging Affords riding on play equipment Affords shoveling Affords balancing-on-bar Affords balancing on springrider Afford hiding Affords storing toys Affords mural painting Affords pulling Affords planting seeds
Attached objects: play equipment	Affords sliding Affords hopping Affords chatting Affords hiding Affords sitting-on Affords feeding birds
Vegetation and animals	Affords smelling Affords picking flowers or leaves Affords harvesting fruit Affords eating fruit Affords touching fruit or tree bark Affords hiding Affords of watching/observing Affords searching and catching jumping spiders Affords hearing sounds of animals Affords using plants as play tools
Microclimate	Affords feeling of breeze Affords watching rain Affords seeing movement of foliage Affords seeing shadow patterns Affords feeling the warmth of temperature

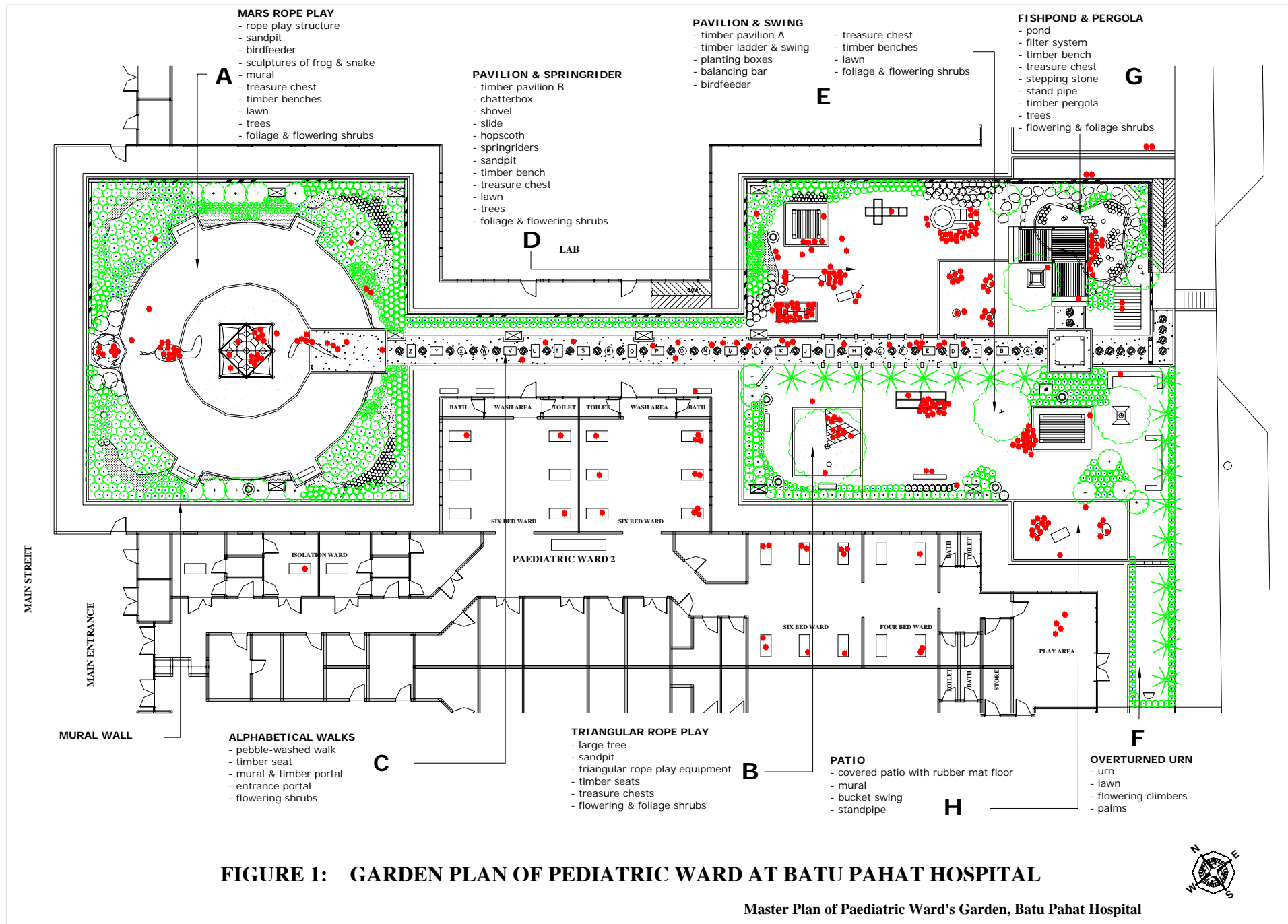


FIGURE 1: GARDEN PLAN OF PEDIATRIC WARD AT BATU PAHAT HOSPITAL

Master Plan of Paediatric Ward's Garden, Batu Pahat Hospital

