ENGAGING HOLISTIC HEALTH THROUGH ACTIVE DESIGN IN PUBLIC SPACE
ABSTRACT

Everything that an individual knows, thinks, feels, and perceives is ultimately formed by a culmination of experiences within his or her constructed environment. Beginning with early stages of childhood development, an individual begins to develop schemas through which he or she processes internal conditions and external factors of the surrounding environment. Education through self, family, school, community, and social media further contributes to this development as the learner grows and changes over time. However, recent changes in cultural values have altered the way children develop physically, cognitively, and socially (1). Considering these factors as primary influences on the individual’s holistic health provides an opportunity to rethink current strategies that address the decline of health in the United States today. The increasing pace of life and reliance on technological methods has produced a demand for a “band-aid” or “quick-fix” approach to improving holistic health and learning. In other developed countries, proactive and preventative measures, rather than reactive methodologies, form the foundation for improving health and learning conditions (2). Such approaches often utilize the built environment as a means of generating opportunities for self-exploration of health and learning.

In the United States, education typically occurs through curricula in the educational institution, and factors of holistic health, considered separate entities, have few designated spaces. In contrast to this system, we contend that learning is an interwoven subcategory of holistic health, which is the combination of Mind, Body, and Spirit. Rather than housing these factors in separate facilities, we intend to investigate using public space to create opportunities for balanced development of the three factors of holistic health.

We envision utilizing public space to develop an urban network that connects community resources to a public activity center through a system of sensorial connectivity in order to engage the individual and community in a cycle of learning, public space, design, and holistic health.

We site our investigation in an urban neighborhood in Pittsburgh, Pennsylvania. Due to decline of public schools from lack of funding, a growing disconnect between neighborhoods and communities from gentrification, and below average health status, the local community could benefit from a new ideological approach to health as well as a new design strategy for urban connectivity.
Holistic Health: This approach to health and lifestyle extends beyond the Mind-Body connection of attaining and maintaining wellness. This methodology values overall wellness and “wholeness” and considers all parts of a person’s life (temporal aspects, physical ability, mental health and wellness, emotional well-being, spiritual beliefs and values and external influences) as integral to the balance of:

   Body: The factor of holistic health defined by the balance and communication of physical activity, nutrition, genetic composition, and coordination

   Mind: The factor of lifestyle health defined by the balance and communication of the ability to learn, retention of knowledge, and capability for abstract thought

   Spirit: The factor of lifestyle health defined by the balance and communication of self esteem, self empowerment, and self identity in relation to the community

Public Space: Any physical areas or elements that community members can freely access

Sensorial Connectivity: Design elements in the built environment that stimulate sensory reception through the perception of taste, smell, sound, sight, touch, and proprioception

Resource: Facilities, programs, public spaces, and goods and services that community members can access

Community: A population and the social aspects that comprise a neighborhood

Neighborhood: The physical built environment aspects of a section of a town or city
The development of a person's health begins with learning: about his or her body, about general knowledge, and about ways to learn. Learning as a voluntary action occurs best within the realm of designed public space, wherein the individual comes in contact with many environmental factors both inside and outside of his or her control. These environmental factors, in conjunction with design of aspects of public space, engages the individual by presenting opportunities to learn through the exploration of his or her self and surroundings. This process of engaged exploration strengthens the Mind, the Body, and the Spirit of the learner's Holistic Health.
THE INDIVIDUAL CHILD

Research on the ways that people learn shows that genetic musculoskeletal traits, cognitive and behavioral tendencies, and age all have an impact on learning. However, age in particular stands out as a highly controllable aspect of education. The age span of elementary school attendance, or between ages 5 and 10 years, is when children are most impressionable and most readily acquire knowledge (3). In terms of health, this age presents the greatest opportunity for children to develop lifelong habits of holistic health. Therefore, we investigate health learning at the scale of the child.

Influences on Childhood Learning and Health
Unlike typical schooling in the Western tradition, which focuses on learning through tests and standard curricula, learning through and about holistic health mandates the incorporation of spatial, social, and physical aspects into the learning environment. Allowing alternative education ideologies, such as Multiple Intelligences and Constructivism, to become entwined with school curricula and learning methods provides the potential for children to engage with the built environment and to explore their own preferred means of actively seeking knowledge. (4) (5)
DESIGN IN PUBLIC SPACE

The scope of an individual’s existence and experience within any environment is guided and shaped by surrounding conditions. The design of any public space reveals present environmental conditions which affect the child’s development. Because the built environment can visually display the other environmental factors, public space has the potential to motivate change through the people that use the spaces. In this way, positive environmental factors can augment public space, and negative influences become opportunities to improve surrounding conditions. (6)
Access to designed features of public space is integral to the engagement with and exploration of space, especially for children. However, the evolution of urban space often removes the individual from contact with nearby resources and spaces due to physical barriers such as roads and psychological deterrents such as deteriorating infrastructure (7). The potential to overcome environmental barriers through the design of active, engaging paths, spaces, and neighborhood resources can provide greater opportunities for children to actively explore their surroundings.
ACTIVE DESIGN

Because the built environment and access within can significantly affect a child's perception of and interaction with his or her surroundings, the design of active spaces can create opportunities for active exploration. A "common understanding of behavior and experience from existing practice indicate[s] that [design] measures will likely increase physical activity" (8). While ideas of active design are often linked only to physical activity, design can also provide exploratory learning and social engagement potentials incorporated into activities. "Active Design Strategies" discusses in detail the role of design practice in augmenting health, learning, and space. (8)
In recent years, new approaches to health have arisen across the world. One ideological system is that of the relationship of an individual’s Mind, Body, and Spirit. As seen by the numerous world health theories and discussed in the works of authors such as Deepak Chopri, Eckhard Tolle, and Lao Tzu, the concepts of Mind, Body, and Spirit have existed in many ideologies in varying ways. Interpretations of the role of holistic health in internal and external conditions of a person change with culture, environment, and history. From these interpretations, we define holistic health through the interaction of Mind, Body, and Spirit rather than through the prevalence of genetic diseases and disorders. (9)
In the realm of cultural perception of holistic health, there is a striking contrast between Eastern and Western theories of Mind, Body, and Spirit. Current Western ideology arises from the thought that Mind, Body, and Spirit exist as separate entities that can be corrected through medicinal, surgical, and therapeutic methods. The prevalence of hospitals, correctional schools, prisons, and pharmaceutical medicines all illustrate this “band-aid” approach. Conversely, Eastern philosophies often consider the three factors as resultants of elemental conditions present inside and outside of the physical body (10). Concepts of acupuncture, tai chi, and qi gong are applied to obtain balance between elemental conditions and the individual.
Building on the conclusions of previous health theorists and combining the ideologies of Eastern and Western health principles, we develop a scheme in which the goal of holistic health is defined as maintaining strength and balance of Mind, Body, and Spirit. In this approach, the development of holistic health is of primary importance, as the growth of holistic health is relative to a person’s natural physical and mental traits as well as the surrounding environment. Once Mind, Body, and Spirit are developed into a desegregated triad, they support each other to help maintain the individual’s health.
Whereas the resultant characteristics of a healthy individual is the strength and balance of Mind, Body, and Spirit, the development of the triad is quite complex and is governed by internal and external factors. Through design, utilizing the potentials of positive preexisting conditions, and mitigating the effects of negative influences can generate the opportunity to enable individuals to achieve greater holistic health in different ways. The attainment of Mind, Body, and Spirit health continues a cycle of engagement between child and environment. This process develops the child’s holistic health not through Mind, Body, and Spirit individually, but through the overlaps that define the child’s health.
While Mind, Body, and Spirit are non-hierarchical in the balance of health, the entity of Body has the most impact in the development of health. Whereas the effect of cognitive ability on physical growth is limited, studies have shown that physically healthy youth tend to achieve better social, educational, and self-identity results than non-active peers (11). While the development of Body can directly enable an easier and more comprehensive development of Mind and Spirit, the cycle of Mind and Spirit together is important to creating a stable platform on which to develop the physical Body.
The internal and external factors that affect a child’s development of health and learning play an important role in both short and long term health. Health problems developed in young children typically affect the child’s social, behavioral, cognitive, and physical processes and have the tendency to be compounded through aging. Habits of poor health developed at a young age are often carried into later years, leading to more serious conditions and diseases. However, many health problems such as obesity and habits such as sedentary activities are preventable at the scale of the child. How the child contends with internal health factors, external environmental factors, and issues of self identity play a key role in holistic health development. Prevention, physical maintenance, and education can help children form healthy, active lifestyles. (12)
The quality and conditions of environmental factors surrounding a child not only affect his or her health but also provide insight into the health of a population. In a comparative study done among developed countries regarding childhood well-being, six categories for were used to analyze the topic: material well-being, housing and environment, educational well-being, health and safety, risk behaviors, and quality of school life (13). As a study of general populations, the United States ranked poorly compared to twenty-nine other developed countries:

**DENMARK:**
- Material well-being: 2nd
- Housing and environment: 6th
- Educational well-being: 7th
- Health and safety: 4th
- Risk behaviors: 21st
- Quality of school life: 8th

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<th>Material Well-Being</th>
<th>Housing and Environment</th>
<th>Educational Well-Being</th>
<th>Health and Safety</th>
<th>Risk Behaviors</th>
<th>Quality of School Life</th>
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Factors that Influence Childhood Well-being - Average OECD
The two levels are linked by staircases and ramps which are designed to stimulate and challenge the children’s sensory and motor skills.

Passive construction uses healthy materials sustainable techniques. The building is constructed from pre-fabricated wooden insulated wall segments, and generous glazed facades provide daylighting and passive solar heating.

The integrated kindergarten sets new standards, as sustainability and pedagogy are considered in the design. The construction is a certified passive house, using minimum energy.

Environmental factors related to the physical environment are important in addressing childhood needs and well-being. In the Dragen House, physical conditions are addressed through design by using sustainable techniques, and the design of regulated spaces to run around, explore, climb, and play influence the conditions of health and safety at a small scale. The active stimulation created by the space yields a higher quality of school life and educational well-being. The goal was to provide a space for kids to enjoy attractive and physically challenging surroundings to support learning and growth. (14)

The total area of 414 m2 for play space for the 88 children far exceeds the minimum standards of 268 m2. This reduces the risk of spreading illness and generally opens up more space for activities.

Figure 6

C. F. Møller Architects | Odense, Denmark | 2009
OBESITY AS AN INDICATOR OF POOR HEALTH IN THE USA

What many have termed an “epidemic of obesity” in the United States today is a significant problem because it leads to many short and long term health complications and negatively affects the growth of Mind and Spirit. While weight is just one indicator of poor health, the condition is most often influenced by many environmental and social issues. Today obesity and its associated health conditions are a leading cause of death, and many issues that stem from weight can be addressed through preventative measures in childhood (15). The introduction to healthy habits through education, access to quality nutrition at the home and school, and active design in the community can help to educate and mitigate current problems of childhood health.

Changes in Obesity Prevalence Among Low-Income Preschool Children
The garden is a learning space and tool for children to understand plant growth, soil conditions, local food, and nutrition.

Children tend to the garden as part of the school curriculum.

The food grown in the gardens is often prepared and cooked by the children for their lunch.

By participating in cooking classes, students learn healthy recipes that they may hopefully will bring back home for family meals.

Outdoor fitness equipment is often found on sides of walking trails or in designated areas of parks and is marked by bright colors, encouraging user engagement.

For safety reasons, fitness parks are typically just for adult use. Figure 9

Berkeley Unified School District's Network for a Healthy California Garden and Cooking Program seeks to educate all students on the importance of eating fresh fruits and vegetables and being physically active every day. Through hands-on gardening and cooking-based nutrition education classes, students learn about where their food comes from and how to prepare healthy meals (16).

Fitness parks throughout the country in parks and on trails, though mainly intended for adult use, often help develop community-wide interest in healthy lifestyles (17).

Integrating the same ideas from these program-based initiatives into the surrounding context of public space with a design solution, could work more effectively to perform as educational preventative measures against current physical health problems.
The aspects of holistic health, Mind, Body, and Spirit, combine to help form the child’s identity. Internal factors, including social interactions at home, at school, and in the community, socioeconomic issues which often influence family lifestyle and opportunity, and conditions of the built environment that surround the child daily impact how the child develops and understands the qualities and conditions of his or her own life. For example, overweight children who suffer from their peers’ teasing or bullying, often develop a negative self image, loss of self-esteem, or increased risk of depression as a result. Besides weight, other environmental factors such as family, school, and social influences can also impact the development of positive or negative self image. Because Mind, Body, and Spirit are interwoven, loss of positive identity can affect all three, leading to poorer holistic health. (18)
Individual identity can be agglomerated at different scales to reveal the identity of a community, a city, or even a nation. Cities and countries are often defined by the overall health of their populations and, more importantly, the **infrastructure** that supports this health. For instance, Denmark is nationally known for its prevalence of bicycle transportation routes and bicycle-friendly infrastructure. Spain is known for its networks of pedestrian paths, and the United States is known for roads and fast-food restaurants. The correlation between the overall health of population and prevalence of active infrastructure becomes apparent at the scale of the individual.
CHILD HOLISTIC HEALTH CONCLUSION

In the development of an individual’s holistic health through Mind, Body, and Spirit is based on how the child understands external environmental factors, internal physical health, and internal self-identity. Specifically, external conditions that relate to the child’s knowledge of holistic health values, ability to regulate physical health, and ability to generate a positive self-image and self-identity are most relative to the role of holistic health development and learning at the child’s scale. Not only are these factors of high importance to the child scale, but contending with these issues provides the greatest potential for design in public space to influence childhood health and learning.
An analysis of projects and concepts that propose means of influencing the dynamic between the child and surrounding environmental context can reveal the effectiveness of design in public space. The Dragen Children’s House utilizes overall design to encourage physical activity and development of Body, a technique effective in increasing the energy and activity of a space and its users (19). Neighborhood-based gardens and exercise pathways represent means of encouraging the use of Mind for exploration of physical health knowledge (20). Community-wide, health-based infrastructure can reveal the overall self-image and identity of a place’s population, potentially effecting the growth of Mind in children who belong to such a place.

Figures 15, 16, 17
The schoolhouse in the past has been considered a central point, visually and functionally, in many small communities for centuries. Even today, when large school networks service whole cities, the school is a primary aspect in children’s lives for most of the year. At a typical public elementary school, the child learns, has social time with his or her peers, consumes meals, and is allowed some form of physical activity. Because so many factors of childhood development occur here, the architecture of the school that enables function and program can also provide exploratory and active learning opportunities for the child.
THE CHILD’S DAY

Most elementary school aged children spend, on average, over half of their waking hours at an educational facility or school (21). This scenario provides an opportunity for the design of the school and its immediate surroundings to affect the ways a child learns, perceives his or her surroundings, and engages the Mind, Body, and Spirit. Design specifically impact the means and spaces of the child’s interaction with his or her environment. Movement to, through, and between learning spaces becomes highly important, as it includes engagement and association with knowledge, physical elements, and social situations both inside and outside the schoolhouse.
Children learn about the color spectrum, light conductors, and complimentary colors and develop “light codes” by moving the plastic panels to reflect and chance the light patterns.

Children play in and climb on the Spy Wall while observing others through the multifunctional openings of the structure.

Mirrors and forms to climb on are positioned through the hallway for exploration and observing others.

Panels enclose the red “sensitive listening area,” where children interact and move the panels to hear different sounds.

As children move along the hallway, the bright colors, abstract forms, and inviting elements provide activities that support the science curriculum while allowing the students to be active learners.

Located in one of Berlin’s poorest neighborhoods, the Carl Bolle School emerged from workshops between students and designers in order to turn an inaccessible hallway into a multifunctional exploratory space.

The storyboard that emerged was that of “The Spy in the Shimmering Cloak.” As children move through and explore the linear space, they come across materials and installations which stimulate different senses. The driving concept was to incorporate this hallway into the school’s science and physical movement curriculum, as the children use this playful environment for learning about scientific observation during class time. This project is successful in combining curriculum with physical movement and space to increase the level of engagement of learners and the overall health of students. (22)
ACTIVE VS. SEDENTARY LIVING

Both at school and at home, the amount of time that children have been spending on sedentary activities has increased in recent years. In addition, average recess time and quality of physical education classes have also decreased as schools struggle to meet budget allowances. Research shows that even twenty minutes of recess during the day can significantly reduce BMI values and active children generally receive higher grades than non-active peers (23). While these issues are often dealt with through curricular structure, design of active learning spaces and safe routes to school can encourage different ways to actively engage in learning and health.

<table>
<thead>
<tr>
<th>Active Daily Schedule</th>
<th>Sedentary Daily Schedule</th>
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<tbody>
<tr>
<td>Morning Free Time</td>
<td>Low Morning Energy</td>
</tr>
<tr>
<td>Healthy Breakfast</td>
<td>Quick Fix Breakfast</td>
</tr>
<tr>
<td>Walk to School</td>
<td>Drive/Bus to School</td>
</tr>
<tr>
<td>Active Class Activities</td>
<td>Non-Interactive Classes</td>
</tr>
<tr>
<td>Garden Prepared Lunch</td>
<td>Cafeteria Lunch</td>
</tr>
<tr>
<td>Recess</td>
<td>Short Recess</td>
</tr>
<tr>
<td>Active Class Activities</td>
<td>Non-Interactive Classes</td>
</tr>
<tr>
<td>After school Activity Program</td>
<td>After school Activity Program</td>
</tr>
<tr>
<td>Walk Home or Meet Parents</td>
<td>Drive/Bus home</td>
</tr>
<tr>
<td>Outside Play Time</td>
<td>TV/Video Game Time</td>
</tr>
<tr>
<td>Family Meal</td>
<td>Periodic Snacking as Dinner</td>
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<tr>
<td>Homework</td>
<td>Homework</td>
</tr>
<tr>
<td>Play Outside</td>
<td>TV/Video Game Time</td>
</tr>
<tr>
<td>Bedtime when Naturally Tired</td>
<td>Late Bedtime from Excess Energy</td>
</tr>
</tbody>
</table>

Active and Sedentary Daily Schedules
Colorful and amorphous exterior conveys energy and draws unique interest. Exterior form engages thinking about interior space and relationship between visual appearance and intended use.

Uneven floor surface engages the mind and body to coordinate motion and balance. Interior colors and forms generate imaginative possibilities. Interior spaces and shapes allow varied use while allowing users to actively explore opportunities.

Light, open space and references to nature lends a "primitive" atmosphere.

Figure 22
NUTRITION AND MEALS

Elementary school children will typically eat at least one meal during the day at the school or educational facility. Many of these children are part of a free or reduced lunch plan, and too often cafeteria lunches do not provide the nutrients or quality of food that children need in order to remain focused on school work or to properly develop their musculoskeletal systems. Paired with the potential limitation of access to healthy food from home as well as school, children often do not receive the proper quality and quantity of food nutrients. (25) In addition, the abundance and easy access to fast food meals and cheap, processed, or frozen snacks with low nutrient density negatively affects the access children and low income families have to healthy food and nutrition education.

Percentage of 4th-Graders Eligible for Free or Reduced-Price Lunch

No Car or Supermarket within a Mile

Lbs of Packaged Sweets, per Capita
Spaces specifically for learning about food growth and preparation help education about nutrition.

Outdoor play spaces include opportunities for self and taught education about plants and the environment.

Windows and outdoor spaces allow in sunlight and fresh air as part of the child’s experiences.

Fresh food from local sources as well as food grown by students and faculty becomes much of the school lunch food.

Colorful interior and exterior elements create a vibrant, energetic atmosphere.

Fun, open interiors create good space to interact during lunchtime and free time.

Figure 26

The Buckingham Elementary School takes initiative through both design and architecture to influence the physical health of its students. Many public schools in the United States have implemented action to improve the quality and nutritional value of the foods they serve for lunch, but unlike such schools, the Buckingham School has spaces designed specifically for education about how food is grown and prepared in healthy ways. The students also have a participatory role, as some of the food grown and prepared at the school is provided as food for lunch. The design of open and vibrant spaces in addition to the focus on healthy nutrition is intended to improve the energy and activity levels of children. (26)
Typical education systems that promote standardized learning methods, tests, and curricula often restrict the child’s freedom to explore ways of obtaining and expressing knowledge. However, the design of the educational space can influence the means of teaching, testing, and thinking. The ability of the child to be able to explore knowledge and learning in different ways can be utilized both inside and outside the schoolhouse. Alternative education models, such as Montessori and Steiner Schools, have explored means of using curricular structure to influence the designed space, but design itself can also impact curricular structure as well. (27)
Designed elements within a larger space create areas for individual focus or small group work sessions.

Heavy emphasis on use of computer technology makes learning less dependent on spatial arrangements.

Movable tables and seats and variable arrangements create the opportunity for guided group learning.

Colors are used to indicate presence of structure in learning, areas for play, and spaces for work.

Fun, open interiors create good space to interact during free time.

Large “installation” elements create space for more traditional facilitated learning methods.

Following the Vittra educational plan, which includes such objectives as providing laptops to students and mixing grade levels, this school provides many opportunities to learn and to explore knowledge. The building follows a “white box” approach and contains elements that enable learning and teaching in different ways. Because technology plays such a large role in the school, spaces are designed for easier use of computers and therefore have few spatial restrictions. However, hands-on, facilitated, self-taught, collaborative, and play-enabled learning are all encouraged at different levels. In addition, grade-level mixing encourages exploration of topics depending on the cognitive level of each individual child. (28)
The school is a primary influence in the child’s development because most of the child’s day and most of the child’s initial influences stem from the learning environment. The school schedule, including before-school and after-school activities, active and sedentary times during the school day, the school lunch, social peer interactions, and the types of learning enhanced by the school design all contribute to the development of the child’s holistic health through the Mind (29). Even though most of these factors are related to or based in the school context, design of spaces in any space can fulfill educational goals and provide learning opportunities.

Children spend the majority of their day within the school confines therefore the school day schedule should include more physical activity.

A sedentary vs. active lifestyle during the school day influences the health of the body.

Access to healthy food is determined by the school and home resources.

When a child succeeds in school they build their confidence and motivation to keep being successful.
Because the school is a physical structure, the design for places of learning is of high importance in the cycle of holistic health. As in the Destiny Lofts, the design of surfaces and elements within a space can not only complement a set curriculum but also influence the structure of a curriculum (30). The Buckingham School contends specifically with incorporating knowledge of healthy nutritional habits into the child's daily schedule (31). The design implications of this move provide insight for designing curricular enhancement. The Vittra School also deals with curricular structure, signifying ways to deal with contemporary technological use within the school realm (32). Investigating ideas of school-related design to impact curricular structure benefits the cycle of health and learning and creates potentials to utilize design techniques to influence greater health.

Creative design features can encourage users to be more active during the day.

Schools can offer food production, nutrition, and preparation as part of the curriculum while feeding students. This is a successful learning tool and positively impacts the child's mind and body.

Learning can be enhanced by the school design when the design can include options for the child to explore how they learn best. Interacting with a space where the child can feel motivated to learn, will build their confidence.

Figures 28, 29, 30
Public spaces are the areas that make up neighborhoods, streets, outdoor areas, and buildings for publicly funded programs. Community resources may take many forms: nonprofit organizations, businesses, schools, medical centers, foundations, scholarships, or any number of other publicly accessible programs. Community members go to public spaces to participate in physical, cultural, social, and educational activity (33). Public space is typically recognizable as programmed, unprogrammed, or flexible space, but in order for public space and programs to be used, they must be accessible to all community members. The built environment and infrastructure play an important role in this accessibility, as paths of access must be safe, in good condition, and engaging to users.
The United States today spends more than twice as much capital on health care as other developed countries do, yet our population’s health status is considerably lower. This inconsistency reveals that more care is provided than necessary, creating inefficiency in the health care system (34). In other countries, twice as much capital is spent on providing social services to citizens than on health care and more emphasis is placed on providing to people the things they need to live healthy lives. Such measures attempt to decrease health issues through proactive, rather than reactive measures. This system can more optimally balance capital expenditure by reducing excess costs of reactive practices.

OECD Total Health and Social Services Expenditures

OECD Spending on Health Care

OECD Total Health and Social Services Expenditures

Figure 31

Figure 32
Dense urban housing lines the blocks surrounding the park, providing access for the community members.

Ambiguous objects and patterns are scattered throughout the park and provide a place for children to explore and play.

Sculptural benches are placed throughout the parks for relaxation and observation.

Green park space is added though one of the parks.

A bike path runs though all three parks and connects users to the city.

Non-specific equipment is seen through the park and used for play, recreation, and exercise.

Superkilen Urban Park is a project that provides unique public spaces which support the surrounding communities. Located in a low income, densely populated, and culturally diverse area, the network of three distinctly visual parks allows for people of all ages to participate in a variety of social activities. The big and small features of the park create opportunities for play, exercise, biking, relaxing, and exploring, and the space is often used for cultural festivities and markets. The public space is important in this city as it provides an active place for people who may not have the opportunity and access to community resources. The city of Copenhagen has many projects and ideas dispersed throughout the urban plan which provide space, opportunity for recreation, and social services for the public good to utilize. (35)
Many urban communities within the United States are faced with issues such as below average income, limited accessibility to healthy food, safe places for children to play, and limited public resources. Correlations between family income and access to community resources also influence health status. Children who live in neighborhoods with few amenities, accessible sidewalks, walking paths, parks, playground, recreation spaces, or community centers have 30-40% higher odds of becoming obese or overweight compared to children who can access to these amenities (36). While weight is only one measurement of childhood health, it is most directly related to factors such as neighborhood resources and the built environment.

**Prevalence of Obesity in Children by Poverty, Income, Sex, Race, Ethnicity**
Located in Chicago’s Grand Crossing neighborhood, the Gary Comer Youth Center offers students from nearby schools a safe, welcoming after-school space for indoor activity. The center provides a place for “at-risk youth” to spend time after school and to engage in safe, regulated recreational activities. The At-Risk Youth Program is geared towards reducing negative influences (37). The exterior of the building is composed of brightly colored panels which reference the center’s youthful orientation and create a positive icon for the community. The panels are arranged in a random pattern and are easily removable in response to damage or vandalism. In addition, the roof garden provides the community with fresh produce and the opportunity to get involved with the youth and community center.

The facade is colorful for the children and becomes an icon for the community. Programs are showcased through showcased windows and layers of visibility between programs inside.

The enclosure provides a safe place for children to engage in after-school activities.

The roof garden allows community members and kids to help grow and learn about the plants.

The cafe and local markets and restaurants use the fresh food as well, connecting the center to the community. Figure 38

John Ronan Architects | Chicago, IL
PITTSBURGH BACKGROUND

Pittsburgh is located in South Western Pennsylvania. No longer the dirty steel town of old, Pittsburgh is now seen as a city distinguished by its unique and diverse neighborhood identities. Neighborhoods and residents are often tied to their “Pittsburgh roots,” and many areas are often house long-standing residents. Pittsburgh as a metropolitan area is often rated as one of the most livable cities in the United States (38), but like many cities, incorporation of suburban data obscures the urban conditions of lower family incomes, denser living, higher crime, lower levels of education, and infrastructural conditions.

United States: $51,425
Allegheny County $46,641
City of Pittsburgh: $35,753
Pittsburgh has 712 public stairways with a total of 44,645 steps, giving Pittsburgh the distinction as the U.S. city with the most public stairways.

Stairways have a long history in Pittsburgh as they have always been used to connect neighborhoods across the hilly terrain.

Cold snowy winter months are not absent of activity as the downtown PPG plaza gets filled with a popular ice rink.

Schenley Plaza hosts many free concerts, festivals, and activities for the general public and surrounding universities.

The three rivers meet at Point State Park, surrounded by bridges where art festivals, river events, music, and fireworks, take place along with being a geographical icon for the city.

Pittsburgh’s unique landscape, terrain features, skyline, people, history, culture, educational institutes, distinct neighborhoods, and public spaces create a city with high diversity and opportunities. Stairways are prominent features, connecting neighborhoods above, below, and on the steep hills surrounding the city. Three rivers converge near the downtown sector and are bridged at many locations. Festivities, cultural fairs, music events, theater, food, and health-care focused business create opportunities of community-wide engagement.

Figure 43, 44, 45, 46, 47
LAWRENCEVILLE DATA

Lawrenceville developed as a district to house those who worked at the nearby mills, mines, and weapons arsenal. The working class neighborhood spirit thrives here and reveals the neighborhood’s identity. Lawrenceville is located just a mile east of Downtown Pittsburgh, runs along the Allegheny River, and is bordered by industrial, retail, and low and high income residential sectors. The population of Lawrenceville and the area surrounding the Arsenal Elementary School show great differences in race due to recent gentrification of the area. The divide in race also follows a similar socioeconomic divide in the area and can been seen in the neighborhood environmental factors and social services available. (39)
New construction and renovation is seen throughout the streets of Lawrenceville.

Thin row houses are the most common residential typology in the neighborhood as young professionals buy dilapidated homes and lots at low prices.

New retail, restaurants, art galleries, and bars have opened up and these young adults are seen biking, walking, and fixing up old houses. Although the business center is thriving, the original residential community and families are disconnected from this new neighborhood camaraderie in their community. “Lawrenceville is one of Pittsburgh’s hottest neighborhoods, filled with cool restaurants, galleries, and retail shops along the impressive main street called Butler Street. From lower Lawrenceville to Upper, there’s a place for all the young professionals flocking there, including the artists and creative folk. Here you’ll find new townhouses and condos alongside old row houses, some renovated, some ripe for it.” (40)

Arsenal Park, located behind Arsenal Elementary School, is used for typical park activities like basketball, walking, and sports, but private fitness classes often use the park for their needs.

Currently, a young population of new professionals is moving into the neighborhood. Many art galleries, boutiques, restaurants, and bars have opened up and these young adults are seen biking, walking, and fixing up old houses. Although the business center is thriving, the original residential community and families are disconnected from this new neighborhood camaraderie in their community. “Lawrenceville is one of Pittsburgh’s hottest neighborhoods, filled with cool restaurants, galleries, and retail shops along the impressive main street called Butler Street. From lower Lawrenceville to Upper, there’s a place for all the young professionals flocking there, including the artists and creative folk. Here you’ll find new townhouses and condos alongside old row houses, some renovated, some ripe for it.” (40)
ARSENAL ELEMENTARY SCHOOL AND PARK

Pittsburgh Arsenal PreK–5 is a neighborhood school with a diverse population that provides an academic environment that focuses on developing the whole child. This public school is one of 42 elementary schools in Pittsburgh School District and serves 282 students. The school consistently reports below state average testing scores, a majority of students below average in reading, a decline in math achievement, and low parent and community involvement. Housed in a large 1930’s building, the school lacks computer, art, and music labs for educational purposes. (41)
Arsenal Park is rich in history, but has been neglected for many years with only small rehabilitation projects for specific parts. Historically, the Allegheny Arsenal grounds were bounded by the entire area that spanned from the present 40th to 39th Streets and from Penn Avenue to the Allegheny River. The Arsenal was divided by Butler Street, with the upper park containing brick stables, three small frame buildings, and a powder magazine with storage capacity for 1,300 barrels. After a deadly explosion at the Allegheny Arsenal in 1862, the complex was never rebuilt and surviving buildings began deteriorating. The existing low border wall, built in the 1820s, lines the sloped and hilly park. Stairs and paths exist within the walls, but most are in poor condition. (43)

Arsenal park is located behind Arsenal Elementary and middle school. The park totals about 170,600 square feet in area.

Stairways along entrances to the park bring user up the sloped site.

Original stone wall - dating back to the historic arsenal, lines the exterior of the park.

Facilities and equipment, and historic resource, are in poor condition, therefore not encouraging activity.

Figure 53

Current Site Conditions of Arsenal Park
EXISTING POSITIVE RESOURCES

1. Carnegie Library
2. Stephen C. Foster Community Center
3. UPMC Senior Communities
4. Small Community Garden
5. UPMC Children’s Hospital
6. Sports Fields
7. Schools
8. Bike PGH/Bike Shop
9. Grey Box Theater
10. Butler Street Restaurants/Cafes
11. Art Gallery
12. Bowling Alley
13. Live Music Bar
14. Boy’s and Girl’s Club
15. Playground
16. Bike Path

Key:
- 0.5 Mile Radius
- Path
- Body Related
- Mind Related
- Spirit Related
- Hub Site

Existing Positive Resources in a 0.5 Mile Radius From Site
The Carnegie Library of Lawrenceville is very close to the school and the historic building is an important element in the neighborhood’s identity. (1)

The UPMC Children’s Hospital of Pittsburgh is perched high up on an eastern hill in Lawrenceville. It’s bright colors and form stand out against the skyline. (5)

Arsenal Elementary and Middle School is set back from Butler Street and has a large enclosed playing field. (7)

Butler Street is the main business center for the neighborhood. The street features restaurants, retail stores, bars, art galleries, and business services. (10)

Positive Neighborhood Conditions in Lawrenceville
EXISTING NEGATIVE RESOURCES

While there are many resources that positively affect the Lawrenceville community and neighborhoods, problems and negative influence related the built environment are important to consider. Nearby the school location and throughout the community, many issues influence the walkability and safety of the neighborhood. Busy roads, unlit streets, and deteriorating sidewalks represent some of the common problems. While the presence of these factors can cause children to be far less likely to engage in community-based exploratory learning, it also opens opportunities for investigating potential techniques designed to mitigate the effect of such influences.
Today, the community of Lawrenceville has several programs in place for increasing health and gentrification is yielding some changes within the residential neighborhood. While these changes do positively impact the aesthetic appeal of the neighborhood, the social divide between the young professional and the family core still exists and impacts children’s access to resources (43). In order to provide a safe and stimulating environment for children to explore, design and rehabilitation must be centered around the child.

 industrial buildings, parking lots, and vacant sites are negative influences on a neighborhood, especially when they are boarded up or dilapidated.

 Old railroad tracks can be hazardous for kids playing, biking, or walking.

 Fast food chains and unhealthy food is located across the street from the school, giving children easy access to the unhealthy food.

 Vacant buildings and lots are seen scattered throughout the neighborhoods. These are also surrounded by poor road and sidewalk conditions.

 Traffic-filled streets and cars parked along both sides of thin sidewalks negatively influence the walkability of the neighborhood.

 Figure 56
The design of public space plays an important role in how the child develops because the built environment showcases all of the environmental factors that comprise the identity of a community. The built environment relates specifically to the development of Spirit, as the public space becomes a place for social interaction and for exploration of space and surrounding community. Physical aspects of the built environment, including the presence of positive and negative neighborhood resources and the importance placed on the maintenance of public spaces, creates opportunities for active and engaging design. Lawrenceville in Pittsburgh, PA, provides an effective site to investigate issues of public space due to the location of neighborhood resources and facilities within the social, economic, and cultural context.

Active design in the public spaces can reduce negative influences and positively increase existing resources which creates community identity supporting the child.

Social Services are important as a preventative means to good health.

Having access to community resources allows children to be a part of the larger space and

The more access the child have to resources in their community the better informed they can be about engaging in holistic health activities.
The public space is typically an interwoven network of designs, programs, and policies that contribute to the physical appearance, identity, and liveliness of a place. We contend that design is the most valuable part of public space because it visually reveals influences that underlie the foundation of the place. The Superkilen Urban Park, as a large-scale public design, physical displays attempts to create more activity, exploration, and engagement of and in the community (44). The Gary Comer Youth Center, showcases the effectiveness of incorporating knowledge and physical activity into the urban context (45). In any generic city, the presence of both positive and negative influences can provide key potentials to create more active networks and features that add to the overall well-being of children and communities.

Figure 57, 58, 59
In an urban situation like that of Lawrenceville, PA, wherein neighborhood-based facilities and resources are dispersed with no designed connection, (46) we envision overlaying a new urban, public connectivity network on the existing city structure. In this “hub and spoke” scheme, a central community activity space ties dispersed resources to a central point. The links, or pathways, allow safe, self-guided access from the hub to neighborhood resources and from various community spaces to the hub. The paths are designed to guide users through active “installations” and sensory cues that engage the user in the discovery of new spaces and activities.
OVERLAP OF POSITIVE AND NEGATIVE RESOURCES

While the design strategy is intended to utilize the benefits of positive community influences, it can also capitalize on spaces of negative influence by bringing new purpose and life to the spaces. In Lawrenceville, the distribution of positive and negative resources is fairly even and diverse, allowing for the potential to enhance the urban built environment. Within the design scheme, there is an opportunity to use the paths to enhance community resources as well as the potential for the community resources to yield viability to the paths.
Utilizing Arsenal Park, located adjacent to Arsenal Elementary and Middle School, as a site for the “hub,” creates opportunities to engage children and members of the surrounding communities in design and active, healthy living. Pathways originating from the site tend to repurpose negative neighborhood aspects to generate safe, enticing spaces for all ages. Meanwhile, the hub will include programs and spaces functionally linked with those of the community, helping users learn in a regulated environment before utilizing skills and knowledge in public space.
Positive resources included in the design investigation are selected for the ability to not only engage users in physical activity but also activate knowledge, social skills, and individual motivation. Every public space in a community has the ability to help develop an individual’s Mind, Body, and Spirit simultaneously. For example, the presence of a community garden can be used to learn about plants and nutrition, physically care for plants, and connect to social atmospheres surrounding the garden. Designing within and around community resources to capitalize on the multifaceted health dynamic can enable the use of preexisting resources to help children develop greater holistic health.

### EXISTING RESOURCES IN THE NEIGHBORHOOD

<table>
<thead>
<tr>
<th>On Map</th>
<th>Existing Programs-Resources In Lawrenceville (0.5 mi)</th>
</tr>
</thead>
<tbody>
<tr>
<td>(Positive)</td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>Carnegie Library</td>
</tr>
<tr>
<td>2</td>
<td>Stephen C. Foster Community Center Meals-on-Wheels</td>
</tr>
<tr>
<td>2</td>
<td>S.F.C.C. Child + Frail Adult Day Care</td>
</tr>
<tr>
<td>2</td>
<td>S.F.C.C. Fitness Classes</td>
</tr>
<tr>
<td>3</td>
<td>UPMC Senior Communities</td>
</tr>
<tr>
<td>4</td>
<td>Small Community Garden</td>
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<tr>
<td>5</td>
<td>UPMC Children’s Hospital</td>
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<tr>
<td>6</td>
<td>Sports Fields</td>
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<td>7</td>
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</tr>
<tr>
<td>13</td>
<td>Live Music Bar</td>
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<tr>
<td>14</td>
<td>Boy’s and Girl’s Club</td>
</tr>
<tr>
<td>15</td>
<td>Playground</td>
</tr>
<tr>
<td>16</td>
<td>Bike Path</td>
</tr>
</tbody>
</table>

| (Negative) |
| 1 | Fast Food Stop |
| 2 | Traffic/Busy Roads |
| 3 | Unlit Alleys |
| 4 | Convenience Stores |
| 5 | Limited Natural Space |
| 6 | Private Fitness Clubs |
| 7 | Abandoned Lots |
| 8 | Deteriorating Sidewalks |
| 9 | Vacant Store Fronts |

Existing Program-Resources (0.5 mi. Radius from site)
### NEW COMPLIMENTARY PROGRAMS AND RESOURCES

<table>
<thead>
<tr>
<th>Complimentary Programs-Resources as part of Hub and Spokes (0.5 mi)</th>
</tr>
</thead>
<tbody>
<tr>
<td><em>(Positive)</em></td>
</tr>
<tr>
<td>Digital Media Space</td>
</tr>
<tr>
<td>Edible Garden</td>
</tr>
<tr>
<td>Exploratory Activity Space</td>
</tr>
<tr>
<td>Adult Gym</td>
</tr>
<tr>
<td>Exploratory Activity Space</td>
</tr>
<tr>
<td>Kitchen</td>
</tr>
<tr>
<td>Lecture/Activity Space</td>
</tr>
<tr>
<td>Sports Practice House</td>
</tr>
<tr>
<td>Various Path Installations</td>
</tr>
<tr>
<td>Independent Bike Repair Space</td>
</tr>
<tr>
<td><em>(Performance)</em> Reception Space</td>
</tr>
<tr>
<td>Kitchen</td>
</tr>
<tr>
<td>Open Art Studio/Viewing Space</td>
</tr>
<tr>
<td>Sports Practice House</td>
</tr>
<tr>
<td>Outdoor Theater/Performance Space</td>
</tr>
<tr>
<td>Public Pool</td>
</tr>
<tr>
<td>Undulating Activity Landscape</td>
</tr>
<tr>
<td>Various Path Installations</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><em>(Negative Counterpart)</em></th>
</tr>
</thead>
<tbody>
<tr>
<td>Kitchen/Healthy To-Go</td>
</tr>
<tr>
<td>Trees and Green Barriers</td>
</tr>
<tr>
<td>Lights/Permeable Pavings</td>
</tr>
<tr>
<td>Small Local Food Market</td>
</tr>
<tr>
<td>Outdoor Green Space</td>
</tr>
<tr>
<td>Exploratory Activity Space</td>
</tr>
<tr>
<td>Various Path Installations</td>
</tr>
<tr>
<td>Pathways Prototypes</td>
</tr>
<tr>
<td>Various Path Installations</td>
</tr>
</tbody>
</table>

While existing neighborhood resources are important to use, explore, and learn through, children who do not yet have the physical or psychological ability to access these resources, even through paths, can still engage in similar activities within the central hub through complimentary programs. These programs are designed to augment specific activities that occur at the other ends of the paths in the public realm, and are designed as tools for learning how to engage in and explore neighborhood-based resources. Using the example of a music rehearsal space as a complimentary program to an outdoor music venue illustrates the function and scale of these programs and hub-based spaces.

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**Complimentary Program-Resources as Part of Hub and Spoke**
PHYSICALLY ENGAGING ELEMENTS OF HUB

The hub provides space for various functions and uses that engage children and others in activities. The design of this space, however, can also provide opportunity for active exploration and learning. A focus on designing surfaces and elements within the hub to accommodate unguided activity not only encourages child engagement but also showcases the healthy identity of the hub. The potential success of this design scheme rests partly on its acceptance by the community. A center that encourages active living through programmatic arrangement together with active physical design could likely generate more opportunities for community engagement with health and learning.

Actions and Sensations Experienced When Interacting with the Environment

Manipulation Options for Surfaces and Elements to Promote Movement
ELEMENTS THAT PROMOTE MOVEMENT AND ENGAGED ACTIVITY

Carlo Scarpa’s alternating stairs allow for physical activity between levels but also challenge the mind. Even though the movement up or down the stairs is the same as normal stairs, it challenges the mind because the form is different than what we are used to.

The Kindergarten Kekek uses toy slates with color as an engaging learning and play tool.

The widow cover facade provides a play surface along three walls. The one sided colored panels are interactive and allow children to play a part in ever changing facade design.

The undulating surface on the Maritime Youth House provides a unprogrammed playscape for children.

The wood decking is used to specify the outdoor play surface and creates a landscape to run around on.

Stairs, movable panels, and undulating landscapes all provide examples of how elements of the built environment can provide an interface for engaged physical activity. When people come across functional elements that deviate from the typical, like Carlo Scarpa’s alternating stair pattern, the forms challenge the Mind and Body as the individual adjusts to movement along the unfamiliar (47). People and kids especially are drawn to elements like those of the Kindergarten Kekek, that encourage free-form participation and interaction. In this example, physically manipulable panels change color when children rotate them, changing the entire color arrangement along the façade (48).

At the Maritime Youth House, by PLOT = BIG + JDS, in Copenhagen, Denmark, the wooden deck surface displays enticing aesthetic form encourages kids to run and play along the undulating surface (49).

Figure 60, 61, 62
DESIGNING FOR THE CHILD

When designing for any specific user group, it is important to understand the user's needs as they interact with the space, and therefore the design should reflect the user group's particular identity, ergonomic necessities, sensory abilities, and mental capacities. Child body proportion and ability can be reflected in forms and material that challenge children to explore, engage, and interact with space. As the child's body and mind are rapidly growing and evolving, overstimulation of noise, light, sound, or temperature can be potentially damaging. The application of sensitivity to sensory stimulation in children is important to consider as well. Design tailored to the mental capabilities of the particular age group should make the child feel empowered and motivated to learn as he or she is actively involved in the pursuit of holistic health. (50)
ERGONOMICS AND SENSORY STIMULATION

The Sjötorget Kindergarten, by Rotstein Arkitekter, in Stockholm, Sweden, has specifically designed stair and railing forms that contend directly with height and the accessibility to storage bins and seating nooks in the walls. Attention to dimensions that relate to the ergonomics of the child were highly considered in this project (51). The Anansi Playgound Building, by Mulders vandenBerk Architecten, in Utrecht, The Netherlands, uses tactile and visual stimulations along the surfaces to encourage children to play and explore (52). In the “scientific observation” hallway in the Carl-Bolle Elementary School, the design of interactive tools are installed in order to challenge students’ mental capacities through design by engaging children’s understanding of scientific theories. (53)

The Sjötorget Kindergarten’s design has child scaled elements like low hand rails and small stair options.

Nooks in the walls and wall storage are easily accessible to children.

The Anansi Playgound Building has a façade engraved with images. The idea of the building is to excite and stimulate curiosity and creativity of the children in this case though the tactile surface encouraging children to trace and touch.

Bright colors and stimulating patterns and colored objects excite children and create a fun space to play and imagine.

In the Carl-Bolle Elementary School, information about color and light spectrum is age appropriate allowing the children to engage and interact with the design.

Figure 63, 64, 65

Designs at the Child’s Scale
PATHS

Paths, both natural and man-made, have always existed to guide. Rainfall and animals create paths, and people have made vast networks of road paths in recorded history. While paths are designed to guide, they are not restricted to guiding only. Depending on the design of the path, paths can suggest routes, display routes, force movement, and offer deviation. The way that paths perform is also important. Depending on the wants and needs of the user, he or she can be guided by visual cues, by texture, by light, by sound, by smell, or by physical objects. The design scheme favors connection by visual cues and physical insertions, as these can also take the form of programmed elements for active exploration. (54)
Constant visual reference for path suggest a new movement through space.

Path includes aspects of interaction with the natural environment and the built environment.

Path is unprogrammed and does not connect specific programs.

Multiple interconnected pathways suggest non-linear means of moving through the park.

Undulating landscape enables imaginative individual programming.

Temporal change creates opportunities for different uses over time.

Light built into the path makes for enhanced physical safety and greater psychological comfort.

The Grass Carpet installation on Jaujac, France, displays the path as a texture and a continuous visual cue. Winding its way through a mile of urban fabric, the temporary project acted as a suggested guide to pedestrians, becoming a place to sit, a place for small group gatherings, and a play space for children (55). The BUGA playground places a different meaning on the path. Implied its use as a foundation for imaginative play, it does not connect, but rather creates an intersecting network of routes (56). Pro-Teq’s Glow surface provides an interesting look at material use on paths. This glow-in-the-dark surface increases the physical and psychological safety of using a path at night (57).

Figure 66, 67, 68
Visual connectivity along a path surface defines the effectiveness of the path. Most paths work by providing a constant, unchanging visual reference. However, the “spokes” of this design scheme require a strategy that allows exploration and wandering while still following a suggested route. In terms of a path, visual cues can become “guide lights” of defined movement through space. Contrary to the traditional path, the use of visually similar nodes does not impose patterns of movement or mandate specific uses. Instead, a path of physical elements could suggest movement by using enticing form, material, and color to engage the curiosity and imagination of users. The use of visually similar insertions and elements to recommend an exploratory path is essential to the design.
Red activity structures create a visual field condition that connects all park spaces.

A field condition that reaches into the urban surroundings enables visual access to the park without being in the park.

At least one tower is visible from anywhere in the park. This creates a sense of spatial belonging.

Physical paths are intended for linear movement while red structures and open spaces create opportunity for wandering and exploration.

Design allows movement and exploration in any direction.

Individual structures can be used in many ways, but specifically elevate the individual above the ground plane to enable greater visual scope.

The Parc de la Villette, by Bernard Schumi, relies heavily on the presence of a field condition of visually similar insertions in the parkscape. Acting similarly to the design idea of creating a path through physical nodes, the red, un-programmed insertions constantly remind park visitors of their position relative to the parkscape and surrounding urban environment. In addition to providing opportunities for imaginative play, exploration, and higher viewpoints, the red towers can be imagined as a means of navigation to, through, and out of the park. The prominence of these visual cues could provide linear, rather than spatial, guidance in space. (58)
SENSORY CONNECTIVITY

Sensory perception of sounds, smells, textures, and visual nodes creates an invisible path that acts by leading users via the senses from insertion to insertion. Rather than just utilizing sight as a means of suggesting movement, nodes can employ similar effects by using sensorially interesting auditory, olfactory, or tactile insertions. Unlike visual connectivity, sensorial connectivity actively engages senses that are often not utilized by children during the typical daily schedule. In addition, the use of multiple senses to create paths applies to almost everyone, regardless of sensory or physical impairment.
Touch receptors are used by following the Trail wall, which allows students to independently navigate through the hallway.

The cork material is only used on this trail wall, while other materials are designated to other spaces.

As different floor and wall materials are used in specific locations, they have an acoustic function as well and as the child interacts with the surface they can relate to where they are.

Larch wood siding is used along walls with access to outdoors spaces. These transitional spaces stimulate olfactory letting the child to follow the scent of the larch wood to navigate to the door.

Slate tiles are along southern walls, and though proprioception students can sense the heat being emitted and understand their location to the building outside.

Gordon Murray + Alan Dunlop Architects, had in mind the specific goal to create a school in which the built environment and its sensory stimulating materials all become a learning aid for impaired children to independently navigate through the building. The sensation of touch is provided for navigation in the hallways by a cork wall with grooves and segmented angled pieces that correspond to locations in the school. Stimulation of olfactory sensation is found in the transitional spaces between indoor and outdoor space. Larch wood siding which has a distinct odor, walls this transition space. Auditory cues are perceived through walking on floor materials with different auditory feedback. The sense of heat perception is also utilized with slate tiles along the southern outdoor walls. These sensory cues help students navigate the school space. (59)
Between the Community Hub and the existing resources, the spokes, or paths, take routes along the sidewalks, streets, alleys, and cut-throughs in the Lawrenceville neighborhood. The success of this project’s design scheme, with complimentary programs existing among the Hub, along the insertions and spokes, and within the unification of existing community resources, is determined by improving the detrimental environmental conditions. The paths and activity insertions will pass through the negative existing features, such as currently unsafe alleyways, cluttered streets, and vacant lots. Theoretically, the connectivity of the network as well as the paths themselves will revitalize these areas while making safer, more engaging paths to connect the neighborhood resources.

**ENGAGING PROGRAM CONNECTIVITY BETWEEN HUB AND SPOKES**

Paths Along Negative Urban Conditions to Revitalize Built Environment
Previous parking spaces along a street, the space now is a communal gathering and activity spot.

Swing seats promote active engagement in the space.

Accessible from the sidewalk, and protected from the traffic on the street, the parklet enriches the street life with activity.

Common materials are used in the parklets on different streets as a unifying visual cue.

All parklets provide space for plants, sitting, group and individual interaction, and some kind of physical activity.

The parklets are designed to repurpose metered parking spaces on Spring Street to create mini-parks with seating, planting, and communal public spaces. By functionally extending the sidewalk into the street, they intend to enrich the vibrant street life already present and foster future investment in pedestrian and bicycle infrastructure in the neighborhood. Parklets are small installations which aim to encourage a more pedestrian friendly experience along streets and sidewalks, where people take the time to relax, play, use stationary exercise equipment, enjoy a social atmosphere, or supporting local businesses. The use of inviting materials, colors, interactive objects, and plants draw people’s attention and cause the parklets to differ from their surroundings. (60)

Figure 72
HOLISTIC HEALTH CONCLUSION

Design in public space, in learning environments, and within the child has the potential to improve holistic health. By creating a network of paths that connects the educational facility to surrounding neighborhood facilities, the child is provided with unique exploratory and learning activities. Utilizing the potential of children’s perceptions of elements that enhance the Mind, Body, and Spirit can further the effectiveness of the “hub and spoke” design scheme to influence the cycle of health, space, and learning. Specific aspects of this network, including the hub, the paths, and the engagement elements can be designed such that positive neighborhood aspects, spaces for learning, and areas for activity and engagement become an overlaid network that can expand the realms of access for children and adults alike.

Exploratory learning that happens long the paths nodes and hub encourages activity and health awareness

Designing a path which allows for physical movement between resources, the mind is activated by interaction with the nodes

As the child is exposed to new opportunity to learn about holistic health though the design in the public realm, they will for a more positive identity

The success of the path design influence on the child’s confidence to be an independent learner and explore community resources

Engaging elements of form and material create the desire in children to explore resources and the spaces

Designing for the proportion of the child’s body creates a space where the child feel comfortable and encouraged to interact

Explorative learning that happens along the paths nodes and hub encourages activity and health awareness

Designing a path which allows for physical movement between resources, the mind is activated by interaction with the nodes

As the child is exposed to new opportunity to learn about holistic health though the design in the public realm, they will for a more positive identity

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Engaging elements of form and material create the desire in children to explore resources and the spaces

Designing for the proportion of the child’s body creates a space where the child feel comfortable and encouraged to interact
The child’s role in the “hub and spoke” design scheme can both inform aspects of design in public space and promote positive change in how the child interacts, explores, and learns from features of the central hub, the exploratory pathways, and the preexisting community resources. By designing at the scale of the child in all aspects of the scheme, exploratory activity, self-image, and access opportunities are improved. By creating the hub adjacent to the Arsenal Elementary School, the physical connection between educational facility and neighborhood activity center encourages further exploration of knowledge beyond the school curriculum. Meanwhile, the paths and sensory cues for navigation through the designed network create possibilities for expansion of the child’s knowledge, physical exploration, and self-empowerment to engage with urban spaces.

Figure 73, 74, 75
Considering knowledge of existing ideologies and designs in public spaces, we consider the “hub and spoke” diagram as a way to implement such strategies and develop new techniques for achieving design goals. The design of the network of resources and programs within the public space can be tied together through various types of paths and sensorial cues through design of visual and sensorial connectivity. Forms and materials can play a key role in the way that both path and hub spaces work to define this network. Through this design, we see an opportunity to generate greater awareness of the opportunity for children of all ages to access resources that further knowledge of holistic health. The cycle of learning, space, design, and health continues, as healthier children become better learners and more engaged community members.
Designing at the scale of the urban network - exploring options within the hub and spoke framework

Design techniques for connecting the hub and spoke through programmatic and path conditions will be explored.

Surface and element design, including form and material, will take into consideration the child scale and desired activity, and how movement paths are created.

Working at the broader scale of the urban network of resources and what they offer to the community to encourage better holistic health, down to the small scale with specific visual and sensorial elements to designate program in the hub and along the spokes will realize the ideology of the cycle of learning, public space, design and holistic health.

We will work between two dimensional drawings, three dimension drawings such as axons and perspectives to explore how movement and interaction takes place within the spaces, and with model to developed form and programmatic relations.
Because all architecture thesis projects are to some degree theoretical and will likely not be built, it is important to rigorously push the design of the project through phases in order to test the viability of the thesis prep work and the effectiveness of the design. Both the physical outcome and the evaluation of the project incorporate these stages of design and the drawings, sketches, renderings, and models that represent progress. We test our thesis through three phases: design of the path network and physical paths, design of the means by which the paths interact with the site, and the design of the spaces within the center, or hub, of the project.
DESIGN PROCESS - PATHS

In order to make a path network successful in an urban setting, the ability of the path to make safe spaces, grow over time, and become part of the community is highly important. This path network is comprised of six paths that each obtain a unique character, both in their keyed color and the ways that they interact with their surroundings. As described earlier, each path not only connects resources to the designed hub but also incorporates specific instances in which the user is actively engaged with the path. The paths are based on the concept of the “strip,” which is used as a means of indicating stride length and pacing. The strip is flexible in use, as it can be morphed to become lighting, benches, climable structures, or performance platforms. For older users, the path direction and color can be linked to a mobile phone platform to allow users to connect to one another.

Path Names and Design
Paths as Informers of Program Placement

As the paths enter the site of the center, the location of entrance, speed of user upon entrance, and direction of entrance are taken into consideration in the placement of programs on the site. Due to the slope of the site, a switchback ramp system is necessary to enable universal accessibility, and the paths all must converge at a central area of the site in order to link to a vertical urban overlook feature. In addition, certain programs on the site have their own restrictions, such as the necessity for the greenhouses to occupy the southernmost corner of the site.
Initial concepts of how different programs are arranged on the site and the specific formal design moves spurred from an investigation of overlaps and path connection. The tessellation drawings of M.C. Escher were understood both as a way to envision program overlaps as well as path overlaps. In addition, the ideas of volumetric “3D tessellations” were considered as infinitely variable constructions of site design. At first, the idea of utilizing the existing school as a fabric to change and incorporate into the design became apparent, and some of the first ideas came from proposed connections to the school.
As both the large scale of the site and the difficulties of the site slope became more and more visible, it was necessary to alter the original design ideas and consolidate the project more centrally. The school, as a protected property, could not be altered or used as part of the design, so clear visual connections rather than physical connections became more important. This design scheme places a large volume with a field on top and play courts below central to the site, with a tower sliding out the back and upward to create seating opportunities for the field. In this scheme, the existing park landscape slides over the top of the volume, while the volume of the building looks out from underneath the ground-scape.
The idea of thinking of the ground-scape and volume separately is retained, while the program volumes are dispersed to create a campus of volumes that take up more space on the site and allow the project to “look” in multiple directions. The volumes that are necessary to link together, such as the pool, locker rooms, and gym features, are placed together, while most other programs obtain their own characteristics of popping out of the ground. In this scheme, the site slope has been increased as a means of dramatizing the elevation change, and the field has been placed on flat ground abutting the school. The paths are used as both ways of movement and ways to allow views and light into the upslope sides of program volumes when they cut through the backs of these volumes.
The final design for the center of the project carries most ideas from the previous phase, though much more focus is placed on the outdoor public spaces between volumes. The slope generally follows the slope of the roads to either side of the site in order to make the volumes more visible, and the programs are spread out even further to place emphasis on the scale of the project. In addition, the program and path placement ensure certain view corridors towards the tower feature, and the inclusion of vegetation and landscape design supports the facing and views of the volumes. The relationship between landscape and building volume is retained from earlier stages, allowing the park to remain and complementing the concept of public health through movement.
FINAL DESIGN WORK

In the representation of the project, sectional relationships reveal the complexity of how the building interacts with a sloped site. The diagrams and renderings displayed as final production show how the project can physically and socially change over both short and long time scales. The greenhouse programs are designed specifically to reveal this aspect, as the seasons have an impact on how plants grow. These as well as the open theater feature are designed to open up during the warm summer months to allow the programs to spread into the outdoor public space.

Sections, Diagrams, Renderings
The model of the final design, including both paths and built structure on the site shows the viability of the project of the short time scale. Back-lighting within the physical model refers to night lighting that would be present in the built design to ensure safe spaces for movement, work, and play. In addition, materials are considered as a means of displaying the center as an insertion in the existing landscape and the paths as a surface application on the current urban infrastructure.

Site Model: Night, Day


7. ibid. 3


9. ibid. 2


15. Ibid. 12


19. Ibid14

20. ibid 16
END NOTES


25. Ibid. 11


29. Ibid 11
30. Ibid 24
31. Ibid 26
32. Ibid 28


44. Ibid, 35


53. Ibid 22


25. Ibid. 11


29. Ibid 11
30. Ibid 24
31. Ibid 26

32. Ibid 28


44. Ibid 35

45. Ibid 37

46. Ibid 43


53. Ibid 22


Figures:


5. Chart, “Comparative policy-focused child well-being in 30 OECD countries,” OECD, from “Comparative Child Well-being across the OECD”


15. ibid. Fig. 6

16. ibid. Fig. 9

17. ibid. Fig. 12


Figure 22: Various Images, “Destiny Lofts,” Reversible Destiny Foundation, Arakawa and Gins, from http://www.reversibledestiny.org/#/reversible-destiny-lofts-mitaka-%e2%96%91%e2%96%91-in-memory-of-helen-keller

Figure 23: Chart, “Percentage Eligible for Free or Reduced Lunch,” National Center for Education Statistics, from http://nces.ed.gov/pubs2010/2010015/figures/figure_7_5a.asp

Figure 24: Map, “Food Deserts,” U.S.D.A. Center for Disease Control, from http://www.enterrasolutions.com/2012/10/food-deserts-and-big-data.html

Figure 25: Map, “Pounds of Packaged Sweets per Capita,” U.S.D.A. Center for Disease Control, from http://usatoday30.usatoday.com/news/health/2010-02-09-usda-obesity-maps_N.htm

Figure 26: Various Images, “Buckingham Elementary School,” VMDO Architects, from http://www.vmdo.com/project.php?ID=4


Figure 28: ibid. Fig. 22

Figure 29: ibid. Fig. 26

Figure 30: ibid. Fig. 27

Figure 31: Chart, “OECD Spending on Health Care,” OECD, from http://www.oecd-ilibrary.org/statistics

Figure 32: Chart, “OECD Spending on Social Services,” OECD, from http://www.oecd-ilibrary.org/statistics


Figure 35: Chart, “Negative Social Influences,” Amy V. Ries, from “Adolescent’s Perceptions of Environmental Influences on Physical Activity”

Figure 36: Chart, “Negative Environmental Influences,” Amy V. Ries, from “Adolescent’s Perceptions of Environmental Influences on Physical Activity”

Figure 37: Graph, “Obesity and Socioeconomic Status in Children and Adolescents,” CDC, from http://www.cdc.gov/nchs/data/data-briefs/db51.htm

Figure 38: Various Images, “Gary Comer Youth Center,” Steve Hall, ArchDaily, from http://www.archdaily.com/189411/the-gary-comer-youth-center-john-ronan-architects/


Figure 40: Chart, “Race and Population,” Lawrenceville, PA City Data, from http://www.city-data.com/city/Lawrenceville-Pennsylvania.html

Figure 41: Map, “Median Household Income,” Pittsburgh, PA City Data, from http://www.city-data.com/county/Allegheny_County-PA.html
IMAGE CREDITS

Figure 42: Chart, “Crime,” Lawrenceville, PA City Data, from http://www.city-data.com/city/Lawrenceville-Pennsylvania.html
Figure 52: Various Images, “Features,” Pop City Media, from http://www.popcitymedia.com/

Figure 43: Image, “Pittsburgh Stairs,” Stairway Records, from http://publicstairs.com/index_000008.htm
Figure 53: Various Images, from Google Satellite and Street View Data

Figure 44: Image, from http://denverurbanism.com/wp-content/uploads/2013/06/shorpy.com_.jpg
Figure 54: Image, from Google Street View Data

Figure 45: Image, “Ice Skating at PPG Place in Pittsburgh,” Flickr, User Paul Toth, from http://www.flickr.com/photos/pd-toth/4318121116/

Figure 46: Image, “PAST EVENT: WYEP Final Fridays at Schenley Plaza,” Living Pittsburgh, from http://www.livingpittsburgh.com/2013/06/wyep-final-fridays-at-schenley-plaza/
Figure 56: Various Images, from Google Street View Data

Figure 57: ibid. Fig. 33

Figure 58: ibid. Fig. 38

Figure 49: Chart, “Arsenal Elementary Race,” Lawrenceville, PA City Data, from http://www.city-data.com/city/Lawrenceville-Pennsylvania.html
Figure 59: Various Images, from Google Street View Data

Figure 50: Graph, “Age Distribution in Lawrenceville,” Lawrenceville, PA City Data, from http://www.city-data.com/city/Lawrenceville-Pennsylvania.html
Figure 60: Image, “Steps – Carlo Scarpia,” Flickr, User seier+seier, from http://www.flickr.com/photos/seier/3577405139/sizes/m/in/photostream/

Figure 51: Map, “School Bus Zones,” Data: Pittsburgh Public Schools, “Transportation Eligibility,” from http://www.pps.k12.pa.us/Page/396

Figure 52: Various Images, “Features,” Pop City Media, from http://www.popcitymedia.com/
Figure 62: Image, “Maritime Youth House,” ArcSpace, PLOT, from http://www.arcspace.com/features/plot/maritime-youth-house/

Figure 53: Various Images, from Google Satellite and Street View Data
Figure 63: Images, “Sjotorget Kindergarten,” ArchDaily, Ake E:ston Lindman, from http://www.archdaily.com/438746/

Figure 54: Image, from Google Street View Data
Figure 64: Images, “Anansi Playground Building,” ArchDaily, Roel Backaert, Wim Hanenberg, from http://www.archdaily.com/48692/
Figure 65: ibid. Fig. 20


Figure 69: Perspective Diagram, “Parc de la Villette,” Bernard Schumi Architects, from http://www.tschumi.com/projects/3/

Figure 70: Images, “Parc de la Villette,” Adrian Welch, from http://www.e-architect.co.uk/paris/parc-de-la-villette

Figure 71: Various Images, “Hazelwood School,” Andrew Lee, http://www.worldbuildingsdirectory.com/project.cfm?id=264

Figure 72: Various Images, “San Fransisco Parklet Photos,” Flickr, User sfplanning, from http://sfpavementtoparks.sfplanning.org/parklet_photos.html

Figure 73: ibid. Fig. 63

Figure 74: ibid. Fig. 65

Figure 75: ibid. Fig. 70
OTHER SOURCES


