Contrast in School Landscapes: 
Creating Opportunities for Children to Develop Their Environmental Preferences

An Honors Thesis LA 404

By

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Abstract

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Research demonstrates that by spending time in nature, children learn better, become more interested in nature, and develop an affinity for the natural environment (Kals, Moore, Wells). This research helped initiate a wave of natural playgrounds recently installed across the United States and other countries which typically feature woodland play, water features, and an altogether less-structured play environment. While natural playgrounds create a strong affinity for nature in children (which seems to be beneficial), research does not currently demonstrate that these natural playgrounds provide children with the opportunity to freely form and develop their preferences.

The discipline of psychology provides that through ways of conditioning, designers can elicit a preference in an individual that is the result of that individual's experience of stimuli. While this study does not aim to condition children into a particular preference either for or against nature, R.B. Zajonk's 1968 understanding of the mere exposure effect, explains that children are currently (deliberately or accidentally) being conditioned to prefer the environments they are exposed to, natural or unnatural (Bunting). Psychology offers insight into how to design to avoid unfairly influencing the development of preferences. Gillian Fournier, writer for PsychCentral.com explains the mere exposure effect asserts that generally, the more exposure people have to a stimulus, the more they are conditioned to prefer it (Fournier). By implication, natural school landscapes condition children to prefer nature in the same way completely unnatural school landscapes condition them to prefer non-nature.

The designer analyzed East Washington Academy's school grounds in Muncie, Indiana, and developed a design that allows children to develop their own environmental preferences, either for nature or for the built environment. To accomplish this, the design juxtaposes aspects of built and natural elements in the same landscape, and their proximity to each other affords children a better opportunity to understand the differences between them.
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Author's Statement

Children today prefer the natural environment less than their adult counterparts (Sebba). This evidence helps to substantiates claims that children are developing a fear of nature—biophobia—that opposes their biological inclination toward it—biophilia (Wilson). Unfortunately, by way of the mere exposure effect, most elementary schools and their landscapes (the place where children are supposed to begin forming their understanding of the world around them and their role in it in an unbiased way) perpetuate this noteworthy change in the way children are perceiving nature. Without nature in their schoolyards, children arrive at school, attend classes, and leave, often without experiencing or having meaningful interaction with nature; during their most formative years, children are isolated from nature and deprived of experiencing it in any meaningful and consistent way. Most children today do not have an opportunity to develop a preference for nature at school because their school landscapes lack opportunities to experience nature. Aimed at combating this problem, natural playgrounds do effectively expose children to nature; however, neither landscape type allows children to experience both nature and the built environment simultaneously. While the designs of elementary schoolyards have conditioned children's preferences in the past, and still do, they may also serve as an opportune vehicle by which we can establish conditions for future generations of children to fairly form and develop their own preferences.

Research has also shown that when children spend time in nature at school, several excitingly favorable outcomes occur: children improve test scores, gain interest in nature, and develop a newfound affinity for it (Kals, Moore, Wells). However, the scopes of most studies end here—they do not explore designing contrasting natural and built spaces, and how these relationships may allow children to develop their own preferences for their environment. Current research assumes that an entirely natural landscape is the best alternative to a traditional school landscape, but the mere exposure effect suggests that a purely natural landscape unfairly conditions children and their preferences, in the same way (albeit inversely) as a traditional school landscape (Danks, Moore). Consequently, as designers use research findings about natural school landscapes as the basis for their designs and focus solely on the new natural area and the actualization of their already-proven benefits, they provide children with a new school landscape that is as biased towards nature as the previous landscape was to the built environment.
Psychological studies offer ways landscape architecture can better use an impetus (design) to allow children to find and develop their preferences. Through the experience of environmental stimuli and their consequences children already find and develop their environmental preferences, but the environments they experience unfairly condition them to prefer the built world (Wilson). If landscape architects design environments that effectively juxtapose nature and built form, and children favor the natural experience, they will develop a preference for the natural environment. Conversely, if children experience both the natural environment and built environment, and favor the built, they will develop a preference for the built (Fournier, Zajonks). With either outcome, this type of juxtapositional landscape gives children an opportunity to develop their own preferences and does not dictate them.

Like many other schools today, East Washington Academy provides its students with a typical play area that is as nature-deprived as the next traditional elementary school play yard. Students at East Washington Academy currently have two choices during their time outside: traditional play areas or empty grass fields. Unfortunately, neither option provides children with the juxtaposing natural component that would enable children to develop their environmental preferences from their school landscape. While the school’s mission states it provides “a phenomenal group of educators who truly want to teach and inspire…,” the school’s landscape does not teach and is less than inspirational (Blakely). If East Washington Academy is truly concerned with teaching and inspiring, it should consider implementing a contrasting school landscape that, through concurrent exposure to both nature and the built environment, allows children to develop their environmental preferences.
Statement of Problems and Subproblems

Problems

What are the design characteristics and elements of a natural school landscape, and what does psychology tell us about the way nature in a school landscape could contrast with the built environment to allow children to develop their environmental preferences. In light of this research, how should we design the landscape at East Washington Academy to facilitate the already-accepted benefits of a natural school landscape while also maintaining an opportunity for children to develop their own preference for their environment, built or natural?

Subproblems

- What are the design characteristics and elements of a natural school landscape?
- What are the key components of conditioning, and what setting is necessary to allow children to develop their preferences?
- What are the design characteristics and elements of East Washington Academy’s existing school landscape?
- How can a new landscape design at East Washington Academy facilitate the already-accepted benefits of a natural school landscape while providing an opportunity for children to develop their own preference for their environment?
Assumptions and Delimitations

Assumptions

The following are assumptions made by the designer that help warrant the relevancy of the project.

- Children will continue to spend time at school and have access to the outdoors while there.
- It is both good and important for children to develop their own preferences regarding their surrounding environments.
- East Washington Academy is interested in allowing its children to develop their preferences regarding their surrounding environments.

Delimitations

The following are delimitations made by the researcher that intentionally focus the scope of the study.

- This study will not identify funding sources.
- This study will not address curriculum adjustments or alterations.
- This study will not address children's exposure to the natural or the built environment beyond the school day or outside the school grounds.
Definition of Terms

The following are purposefully informal definitions prepared by the researcher that explain key terms used in the study that are potentially unknown by readers unfamiliar with the topic.

- **Contrast** – The emphasis of differences between two or more elements
- **Juxtaposing** – Two or more elements next to or within view of each other whose differences are readily perceivable
- **Conditioning** – The way by which the consequences of an action influence future preferences and behavior
- **Mere exposure effect** – States that the more exposure a subject has to a stimulus or environment, the more likely the subject is to prefer it
- **Environment** – The surrounding world—which can be either built, natural, or a mix of both
- **Built landscape** – An area where perceivably man-made elements and materials dominate the land
- **Natural landscape** – An area which a designer or the environment has shaped the land so it appears as if it is not dominated by man-made elements and materials
Review of Related Literature
Introduction

While natural school landscapes currently foster a love of nature in children, the landscapes may be creating this preference unfairly. This literature review examines two areas of study—school landscape design in landscape architecture and psychology. It examines the current state of school landscape design and explores instances in which psychology provides ways to foster preference. It explores connections research has made between landscape architecture and conditioning and highlights current gaps in the research. While some of the psychology sources are somewhat dated, they are appropriate as they inform many subsequent psychological studies and give this project a concrete foundation to build on.
An in-depth study of school landscapes which aims to project their future must begin with a brief understanding of their history and current theory surrounding school landscape design. Histories offered by Lolly Tai’s, Designing Outdoor Environments for Children and Randy White’s, “Young Children’s Relationship with Nature: Its Importance to Children’s Development & the Earth’s Future,” both written in 2006, agree that starting in the early 1900’s, children’s play areas became increasingly focused on built structures and strayed away from natural play environments. Both authors emphasize the problem a lack of nature creates in children and the advantages natural play areas offer. The current trend of natural play has happened in response to the past 100 years of anti-nature playgrounds, and as such, natural playgrounds seem primarily focused on (and almost romanticize) exposing a new generation of children to nature. At its essence, the trend promoting natural playgrounds seems to be: nature was once good for children, but society has strayed away from it over the past 100 years, therefore the logical response is to return children to nature to reap the benefits we now know nature-play offers.
Benefits of Nature

Numerous authors report benefits associated with exposure to nature. As Catherine Ward Thompson notes in her 2010 book, *Innovative Approaches to Researching Landscape and Health*, the specific benefits fueling the trend for natural playgrounds vary from improved air quality to enhanced social interaction. Her findings, which focus on children’s health, match well with Christopher Day’s benefits listed earlier in his 2007 book, *Environment and Children*, which adds that natural play areas enhance learning by affording ample opportunities for children to create, imagine, and fantasize. Day’s claims are substantiated by the California Department of Education’s 2005 report, “The Effects of Environment-Based Education on Student Achievement” which empirically verifies children’s exposure to first-hand experiences results in better test scores compared to a control group of students taught in a traditional school setting.

**Takeaway**

- Nature is good for children’s health, development, and education.
Affinity toward Nature

While many authors mention nature's benefit to children, few authors interested in these benefits delve into a psychological analysis of natural play areas or attempt to identify their influence on preference. One author, Rachel Sebba, in her 1991 article, “The Landscape of Childhood, The Reflection of Childhood’s Environment in Adult Memories and in Children’s Attitudes” offers research related to environmental preference. Her study showed 96.5% of adults thought the most significant place in their childhood was the outdoors. In a similar study, she found only 46% of children preferred the outdoors. Her research, however, focuses on preference between indoor and outdoor environments and not directly on natural versus built environments, since an outdoor environment could be considered more built than natural (as is the case with traditional playgrounds). She makes the leap, however, to assume that outdoor means natural and indoor means built, which is not necessarily true; she then makes assertions about the natural versus the built environment which her research does not support.

Some of Sebba’s statistics are also in apparent contradiction to a study done in 1985 by Trudi Bunting and Larry Cousins published in their article “Environmental Dispositions among School-age Children”. Bunting and Cousins used their method, the Children’s Environmental Response Theory to understand children’s affinities toward different aspects of their environment. The authors demonstrate that most children in their study identified most strongly with pastoralism (the category of their study that was most directly associated with the outdoors). Additionally, the authors found that upbringing and gender directly affect the intensities of children’s preference toward pastoralism—urban children prefer pastoralism less-so than their rural counterparts. This validates R.B. Jazonk’s 1968 proposal of the mere exposure effect which states that humans have a stronger preference for what they are used to. While Sebba’s research showed males prefer outdoors at a greater rate than females, Bunting and Cousins claim females have a stronger preference for pastoralism than their male counterparts. Furthermore, the children of Bunting and Cousins’ study showed a much higher preference for pastoralism than Sebba’s participants preferred outdoors—nearly 50% higher. Due to the semantics of the studies, they are not directly comparable, but can, at least, relate to each other.

**Takeaway**

- Studies show children do like nature, but the degree to which they prefer it varies based on their gender, upbringing, and exposure to it, among other factors.
Natural School Playgrounds

Given so much research showing the benefits of nature and children’s enjoyment of it, natural school playgrounds have become a recent trend and dozens of school playgrounds across the United States have been transformed from traditional playgrounds to natural play areas. In her 2010 book, *Asphalt to Ecosystems, Design Ideas for Schoolyard Transformations*, Sharon Gamson Danks offers ideas for evolving existing play areas into more natural ones. Her ideas are similar to those offered by Lolly Tai and also those in Robin C. Moore’s 1997 book, *Natural Learning: Creating Environments for Rediscovering Nature’s Way of Teaching* and focus primarily in explaining the essential elements, design, and the process of creating successful natural schoolyards. They all share a similar quality in that none seem to find value in the school’s existing conditions or built structures already on site. They seem intent on making play areas as natural as possible with little regard to the existing built environment. With built structures as the enemy and nature as the hero, current designs do not consider how keeping built structures in the landscape could improve its benefit to children. Research has not recognized this connection through history, nor does it appear to currently be a topic of interest among professionals.

**Takeaway:**

- Designers have paid little attention to the built environment and its potential benefit when designing natural school playgrounds.
Psychology and Conditioning

To begin a worthwhile discussion of conditioning and psychology, it is necessary to build a common foundation on which the discussion can take place. In his 1968, *A Primer of Operant Conditioning*, G.S. Reynolds explains human behavior is "determined by the environmental conditions and events which precede and accompany the behavior, by the environmental events which change after or as a consequence of the behavior, and by the [human's] previous experience with the environment." In all cases, environments (past, current, or potential) have the ability to influence human behavior and decision-making. He continues to define basically many terms associated with conditioning which mostly agree with the more scientific definitions offered by Jon Williams five years later in his book, *Operant Learning: Procedures for Changing Behavior*. Both authors agree that conditioning affects human behavior and that after understanding these environments, behavior becomes predictable.

While most of their research is congruent, punishment was one area Williams addressed that evolved in the time after Reynolds' writing. Williams borrows his stance on punishment from Azrin and Holz, whose 1966 article "Punishment," delivers a more specific definition of punishment than offered originally by Reynolds. Azrin and Holz stipulate punishment by declaring it is only a stimulus that actually suppress behavior—if the stimulus does not suppress the behavior, it is not truly punishing. This definition seems obvious, but researchers considered it a breakthrough at the time. The definition is now accepted and is further explained and supported by Derek Blackman in his 1974 book, *Operant Conditioning: An Experimental Analysis of Behaviour*.

**Takeaway:**

- Past, present, and potential environmental conditions can influence decision-making so that humans develop preferences. If landscapes are not intended to unfairly influence preference, they must be carefully designed to ensure they do not present themselves in a biased way.
Ralph Blackwood offers beneficial research in conditioning behavior in his book, *Operant Control of Behavior: Elimination of Misbehavior and Motivation of Children*. His research is fairly isolated in terms of its subject matter and is offered to help teachers improve classroom behavior through conditioning. His interest in children is particularly unique, but his understanding of conditioning through passive avoidance is even more powerful. He states that children learn passive avoidance (inaction that prevents a negative outcome) more quickly when the avoided activity is paired with an outlet activity that results in a favorable outcome. This supports that children will learn to not choose an action whose results they perceive as negative consequences more quickly when they have the opportunity to choose an alternative which results positively. Similarly, active avoidance, (making a deliberate choice of action to avoid an aversive stimulus) allows children to avoid the negative consequences of bad decisions by making good choices. This supports the idea that contrast is an important factor when allowing children to develop their preferences; preferences develop better when options are present.

**Takeaway:**

- Children learn more quickly to not make a negative choice when they have an alternate choice which will result positively; contrast allows them to more easily choose their choices and develop their preferences.
Subconscious Preference Development

While Blackwood implies that students must consciously learn the beneficial consequences of their actions (through choosing an action that results in a positive outcome, or not choosing an action that results in a negative outcome) for them to affect their future decisions, David Lieberman's 1974 *Learning Behavior and Conditioning* suggests decision-making can be affected even without subjects realizing their decision is what causes the outcome. This idea is borrowed from E.L. Thorndike's statement and proof that reinforcement is automatic in his 1935 book, *Psychology of Wants, Interests, and Attitudes*. Lieberman demonstrates reinforcement can happen without awareness through empirical data offered in an experiment done by Rosenfeld and Baer. He concludes that learning can influence decision-making even when subjects are unaware they are being influenced; this results in a subconscious development of preference as a result of the surrounding environment and stimuli.

Takeaway:

- Subjects can develop preference, even while unaware they are doing so.
Conclusion

Research has demonstrated nature to be beneficial to children, and children do have an affinity toward it. The degree to which children prefer nature varies, but is influenced by gender and exposure to varying environments, among other factors. Following a recent trend, designers are transforming many school playgrounds into natural schoolyards, but designers have paid little attention to the built environment's potential benefit in their designs. Psychology though, shows that environmental conditions and stimuli can influence decision-making and preference. The mere exposure effect implies that children whose school landscapes are completely natural suffer from similar preference-influencing conditions as children whose school landscape is traditional. Children learn their preferences more quickly through choice when they have alternative options present; preference develops better when a choice is made. By the mere exposure effect, children need to be exposed to both alternatives equally if their preferences are not be influenced by level of exposure. There is great potential to allow children to develop their environmental through a semi-natural school landscape which juxtaposes the natural environment with the built conditions. Even if children are unaware they are developing their preferences, mere exposure to a landscape that blends built form and nature gives children a better opportunity to fairly develop them.
Design Development
Site Summary

Location and Context:

The specific site for this project is the property of East Washington Academy in Muncie, Indiana. The site, bounded by East Washington Street to the south, alleyways to the east and west, and the Cardinal Greenway to the north, is just south of White River (Figure 1). The site accounts for roughly ten acres of land near the heart of Muncie. Since this project aims to demonstrate a design theory that could be implemented at many different sites with varying locations, physical characteristics, and scales, this particular site's location, physical characteristics, and scale were relatively insignificant contributors to the site selection process. East Washington Academy represents a classic elementary school with conventional qualities. The study site was chosen primarily due to its proximity to the researcher and the school's commitment to excellence that aims to provide "...a quality educational environment that allows every student to maximize his or her potential..." (Blakely). These characteristics helped facilitate ease of access to the site and provided a client that valued the content of the project.

Selection and Characteristics:

The property is part of Muncie Community Schools and Mr. Scott Blakely resides as the elementary school's current principal. The site is surrounded by residences to the south and west, and its minimal topographic change, expanses of asphalt, and general lack of splendor contribute to the relatively bland character of the site. Despite its fairly nondescript nature, the site does have features which lend themselves well to this project. The mature woods in the north of the site and a small swath of trees extending from the wooded area southward toward the school provide natural areas the future design could easily build upon and with which the existing built features of the school playground contrast. The main play areas are typical woodchipped pods with stationary metal and wooden play equipment; adjacent these zones an asphalted expanse is used for gathering, picnicking, and basketball. Due to their distance from the school and play areas, the very few natural elements on the site go nearly unused by the children. Most the open areas and unprogrammed spaces in the schoolyard are underutilized and have potential for immediate improvement. For site photography depicting many of these characteristics, see Appendix A on page 66.
Surrounding Context

Figure 1 – Vicinity Map

East Washington Academy
Vicinity Map
Scope of Work

There exists a great opportunity to provide children with a landscape that allows them to create their own preferences for built or natural landscapes through juxtaposing the contrasts of natural and unnatural environments. Blending strategies and techniques from both psychology and landscape architecture, this project explores the ways contrast could be applied in a school landscape to provide children with opportunities to develop their own preferences for either natural areas or unnatural environments. The design aims to resolve site-specific issues at East Washington Academy and deliver the already-accepted benefits of nature play while giving children of East Washington Academy the opportunity to develop their own environmental preferences. The project's design of the 10-acre site will include a comprehensive master plan, planting plan, diagrams, site grading, sections cuts, and appropriate construction details. Some existing landscape elements will be maintained (mainly play equipment and structures), and others will be removed.
Goals and Objectives

Goal 1:
Exposé the school children at East Washington Academy to an increased amount of nature on their school grounds

- By accentuating and creating access to the existing natural features on the site, primarily the swath of trees extending south from the northern site boundary
- By developing a portion of the site as a natural play area with appropriate site elements listed in supporting literature (wooded walking paths, a water feature, and an area which allows for movable play elements, etc.)
- By adding nature to the school’s East Washington Street entrance
- By raising the percent of the schoolyard that is natural to approximately fifty percent

Goal 2:
Allow children to develop their preference for their environment by contrasting the new and existing natural components with the new and existing playground and built structures

- By positioning the new natural elements directly next to or within the existing built areas
- By providing direct views from nature to built form and vice versa
- By emphasizing characteristics of the natural environment and built environment by juxtaposing their qualities with differing qualities of the opposite environment
Figure 2 above shows one of two precedents the designer used to build a working knowledge of successful children’s learning and play environments. This precedent, with Figure 3 to the right, helped the designer understand appropriate scale of spaces, potential unifying elements, and ways built and natural elements can coexist in a single landscape. North Campus, in Los Angeles, serves children as a nature-packed exploratory oasis within the city; its macro-level interaction with its built surroundings later helped inspire Concept 1: Converging Zones of Purity, on page 32.
Figure 3 above shows the Woodland Discover Playground at Shelby Farms Park in Memphis. The designers of the space allowed children to greatly influence both the site design and the elements within it, but insisted on a unifying element throughout the site. A wandering arbored pathway serves as the playground’s main circulation network, and once dozens of planted saplings begin to grow and enclose it, it will begin to bring a sense of nature into the playground from surrounding woodland. The discovery style playground, organized around a circulation system, later helped inform Concept 3: Spatial Sequencing on page 36.
Site Inventory

Figure 4 - Site Inventory
Figure 4 on the previous page shows the designer's inventory of existing elements and conditions that helped inform the design process. Figure 5 to the left depicts on-site systems in an exploded axonometric format that conveniently shows their relationships to each other. These inventories served as the base for the analysis (Figure 6) on the following page. For East Washington Academy Enrollment figures, see Appendix B on page 70.

Key observations include:

- The location of the school's gymnasium, cafeteria, and classrooms
- Under-used recreation courts and fields
- Magnificent existing tree canopies
- Expanses of asphalt
- Pedestrian and vehicular circulation, hydrology, and topography
Site Analysis

Figure 6—Site Analysis
Figure 6 to the left shows the designer's critical analysis of the existing conditions on the site and highlights opportunities and constraints of the design process. Key observations include:

- A low point near the center of the site that routinely floods and could become an ephemeral wetland
- A relatively barren entrance to the school that needs more vegetation
- A staff parking lot that lacks enclosure and needs to be brought to a human scale
- The need for vegetative screens to diminish encroaching visual impositions from surrounding context
- The need to maintain unprogrammed space and open play areas
- Neighborhood blight to the west and south; safety is a concern immediately off school property
- The necessity to maintain a secure premises with conventional fencing
- The need for an exercise path within the safety of the schoolyard
- Opportunity for a butterfly garden where butterflies already gather on site
- Opportunity to open highly fenestrated building whose blinds are usually closed due to unsightly view to the outdoors
Program Development

After using research, case studies, and site inventory and analysis to determine which programmatic elements to include in the re-imagined site design, the designer completed a series of diagrams to further explore these elements. The diagrams on the following three pages show the level of complexity used to determine appropriate site locations for and interactions between the selected programmatic elements. The designer explored several programmatic elements which included exercise stations, climbing hills, walking trails, a wetland, a butterfly garden, and recreation fields among others. On the following page, Figure 7, Opportunities for Contrast, separates program elements into built, natural, and mixed columns, and allowed the designer to easily see how specific elements could juxtapose one another. On page 30, Figure 8 allowed the designer to understand where each programmatic element needed to be sited in relation to the existing school footprint. Finally, on page 31, Figure 9 graphically represents important relationships between the various elements.

In all three diagrams, movable programmatic elements have a single outline, while a double outline denotes a relatively immovable existing element. Yellow boxes represent a primarily educational focus; red indicates play, while green and blue correspond to agriculture and exercise respectively. A box that blends two colors signifies a blending of the two uses.
Opportunities for Contrast in Program Elements

Figure 7 above shows selected program elements’ opportunity to contrast each other. Elements in the “perceived as natural” greatly contrast those in the “perceived as built” column when placed proximately. This diagram helped the designer develop spaces that delivered the most juxtaposition compositionally between built elements and natural ones.
Program Elements' Needed Proximity to the School

Figure 8 above shows selected program elements' needed proximity to the school building. Some elements — the butterfly garden, walking trail, school gardens, and outdoor classroom for example — need to be located in close proximity to the school building. Other elements — the active recreation, climbing hills, rock and boulder station, and workout stations — are better suited further away from the school. This diagram helped the designer make informed decisions in placing program elements spatially on the site.
Program Elements’ Relationships with Each Other

Figure 9 above shows selected program elements’ relationships to each other. Most meaningful interactions happen between elements of similar uses, grouped by the colors of yellow, red, green, and blue. Interestingly, few antagonist relationships developed, each of which dealt with school entrances; according to these relationships, neither the sand pit nor compost center should be located near building entrances, for obvious reasons. This diagram helped inform the placement of program elements relationally on the site.
Concept 1: Converging Zones of Purity

East Washington Academy

Figure 10—Converging Zones of Purity
Concept 1: Converging Zones of Purity (Figure 10) focuses on macro interactions between groups of built and natural elements. In general, the designer split the two types of elements (built and natural) into separate "zones of purity" where they are surrounded by like elements. Given the scale of the site and subsequent spaces, children have the opportunity to be fully immersed in each zone, without much meaningful juxtaposition between the differing built and natural elements. In this concept, spatial juxtaposition happens mostly at the edges of the purity zones where the two realms collide. The scheme lends itself well to children being fully immersed in one landscape type, but does not provide as many opportunities for contrast as other designs.
Concept 2: Mingling of Contrasts

Figure 11—Mingling of Contrasts
While Concept 1: Converging Zones of Purity focused on macro interactions between groups of elements, Concept 2: Mingling of Contrasts (Figure 11) focuses on micro interactions between individual elements and presents a great opportunity for additional juxtaposition. Utilizing key interactions developed from Figure 7 on page 29, Concept 2 provides the highest level of juxtaposition of the three design concepts. This concept served as the basis for the final master plan (Figure 13) on page 38. Key interactions form between the asphalt play area and the wetland, the existing allée and workout stations, and the recreation fields and tree screens.
Concept 3: Spatial Sequencing

Figure 12—Spatial Sequencing
Concept 3: Spatial Sequencing (Figure 12) relies on a half-mile exercise loop at its organizational structure and assumes that most of the children's interactions with the landscape happen while on the path. As such, elements closely hug the exercise loop; their placement generally follows a sequence of built element followed by its natural contrast. After further observing the children, the designer noticed their disinterest in staying on formal paths and inclination to venture off a path in exploration. While this did not eliminate the need for a structured path through the site, it did lessen its viability as a main organizational system.
Master Plan

Figure 13—Master Plan
Figure 13 to the left displays the final site master plan. Loosely based on Concept 2: Mingling of Contrasts (Figure 11, page 34), the designer placed individual built and natural elements in close proximity to each other at the micro level.

**Contrast and Juxtaposition**

This deliberate mixing of contrasting elements provided a high level of juxtaposition in the final design, and to the best of the designer’s ability allows children to effectively and efficiently develop their environmental preferences. High levels of contrast exist between elements such as the asphalt play area and the prairie, the existing playground and the boulder play area, and the exercise stations and existing allée. Additionally, the curving wetland sits in stark contrast to the rectilinear school building, vegetated islands float amid a sea of asphalted parking lot, and an evergreen screen serves as a backdrop to the active recreation fields. A half-mile exercise loop navigates the site and allows children to experience various components of other elements while it contrasts its own surroundings.

**Additional Design Features**

- A previously underutilized asphalt play area gained two foursquare courts and a scaled map of the United States for outdoor engagement
- Evergreens screen unsightly surroundings to the east and west of the school
- School and community gardens provide education and nutrition for both children and their parents
- Improved views from the classroom windows incentivize teachers to leave their blinds open and contribute to improved morale of the school children
- Raised butterfly gardens take advantage of a location where chrysalization already occurs
- Additional vegetation in the front of the school building welcomes vehicular and pedestrian arrivals alike
- A beehive station helps ensure pollination of native plantings and teaches children about their bees’ importance
- Gated access to the Cardinal Greenway grants safe access to a nearby amenity
Supporting Imagery
Site Plan Enlargement

Figure 14—Site Plan Enlargement
FIGURE 14 to the left displays the site plan enlargement of the previously entirely asphalted area north of the school. As a more thoroughly detailed drawing, the plan enlargement delivers a level of information the designer could not show at the master plan level.

Contrast and Juxtaposition

One of the most intriguing and contrasting spaces in the entire site, the area selected for the site plan enlargement juxtaposes built and natural elements, their uses, and their form. Directly outside the school doors, children inhabit an asphalt surface complete with a geography play mural, foursquare courts, and bench seating. The form of the raised gardens beds contrast the flowing butterfly-attracting plants that fill them. Similarly, the tall grass prairie contrasts its geometric containment against the asphalted play area. Children leaving the asphalt tunnel through the tall grass prairie before being released to a view of the apparently natural ephemeral wetland. Continuing along the path, an access bridge crosses the wetland and floats as a contrasting built feature over the much more natural wetland. Where the concrete and urbanite paths meet, a pergola planter covers their intersection. Despite a very geometric form, the planter boxes hold native flower and grass plantings that directly juxtapose the enclosure’s structure.

Additional Design Features

- A ten-foot mowed safety buffer surrounding the entire ephemeral wetland
- Gated vehicular access for safety and maintenance
- Low-profile wetland's edge plantings for safety and visibility to the water
- Ephemeral wetland sized to hold a 25-year storm event of the surrounding areas—nearly 100,000 gallons
- Site grading that sends asphalt runoff through the tall grass prairie, medium grass prairie, ten-foot safety strip, and into the wetland
- Ample space in the asphalt gathering area to accommodate most school groups
Figure 15 above shows the progression from the school building north, through the asphalted play area, prairie, and wetland. From the school, children release through multiple raised butterfly gardens and into a large area of asphalt where they can gather before delving into the rest of the landscape. From here, children enter the remainder of the site through a network of pathways that lead through a more enclosed tall grass prairie. This abrupt transition from asphalt to prairie provides one of the highest levels of juxtaposition on the site and will allow children to readily perceive differences between the two environments. Beyond the tall grass prairie lies another, shorter prairie that allows views to open onto three Willow
tress skirting the ephemeral wetland, sized to contain the runoff from a typical 25-year Muncie rainstorm. Safety around the wetland was of utmost concern to the designer, and as such, a ten-foot mowed safety buffer entirely surrounds it. Shorter wetland edge plantings were chosen specifically to not obstruct a teacher's visibility to the wetland (see Figure 23 on page 56). This space, as one of the most dynamic and juxtapositional on the entire site, is the focus of the site plan enlargement on the preceding page.
Figure 16 above shows the progression through the school's new front entrance. Currently an almost-barren landscape, an improved entry sequence begins at East Washington Street, leads through various deciduous tree plantings and guides children across the one-way drop-off loop. Children and visitors are then greeted by raised geometric beds of native flower plantings; the flower clusters and their lively appearance contrast the rectilinear form of the beds they are planted in. Openings in the beds allow and direct access to all the existing
building entrances and subsequently create a small entry plaza near the school's flagpole for small gatherings, part of which is covered by an entry pergola that mimics the one detailed in Figure 25 on page 58. Flowering Redbuds skirt the school's windows and encourage teachers to leave their window shades open. Once inside, the sights from inside the school provide additional juxtaposition as the school building's obviously built form frames views to native vegetation.
Views from the Ground

Figure 17 above offers the view of two parents watching as their children finish planting their grade's raised garden bed located in a particularly sunny area of the schoolyard. Since neighborhood safety issues required the designer fully enclose the schoolyard, a chain-link fence provided opportunity to juxtapose the more natural form of the garden plants. By design, the rectilinear form and placement of the beds also provide contrast for the plantings.
Figure 18 above relays the view looking out of the pergola planter (detailed in Figure 25 on page 58). The woodchipped fitness path leading out of the planter pergola shelter guides children to a series of exercise stations located under the Thornless Honeylocust allée. All-weather exercise equipment allows children to explore isometric exercises in plain view of prairie grasses, mature tree canopies, and fauna.
Figure 19 depicts the typical interaction a student might have with the ephemeral wetland. Though through the prairie grasses the nearby school building imposes, the student is able to explore the water's edge and find critters living in their own habitats. Nearby friends are within earshot playing foursquare on the asphalt play area south of the pond and would be a reminder of the ever present built environment surrounding the wetland.
Figure 20 above gives a typical experience on one of East Washington Academy's new recreation fields. While the recreation fields stimulate children's bodies during physical education class and at recess, the lofty pine screen behind the soccer goal helps spark their minds. The evergreen screen not only shields the children from the housing beyond it; its natural form and course texture contrasts the manicured, geometric qualities of the play fields.
Figure 21 shows the perspective of an exercise class taking off to run up one of three mounds added on the site. Grouped near the active recreation fields, these mounds provide yet another opportunity for physical activity in close proximity to the existing woodland to the north and allée to the east. Additionally, they serve passively as elevated seating for the sports fields.
Figure 22 illustrates a somewhat conventional, easy-to-read, sign navigating children through the school landscape. It provides a small level of contrast to the natural elements it directs children to. As an erect form in the landscape, it contrasts the short prairie grasses that blow effortlessly in the wind.
The images on the following five pages are technical drawings which provide sample construction documents for selected components of the site. Figure 23 on page 56 highlights all proposed vegetation on site. Drawing standards dictate plant keys be labeled in the AAA-SS format, where AAA represents the first three letters of the plant's genus and SS represents the first two letters of its species. These keys correspond with Figure 24 on page 57 which provides additional information regarding each plant type including, quantity used, common name, container type, size of the plant, specific spacing requirements, and any additional notes the designer found important. Together, these two drawings ensure the correct plants are installed and that they are sited in their proper locations.

Figure 25 on page 58 shows an elevation view of the pergola planter mentioned in previous sections. It provides critical dimensions, materiality, and construction notes. Treated pine is used as the structure while 1/2" bolts, #4 rebar, and angle iron hold it together. The planter boxes were designed to be filled with wild flower plantings of the school’s choice to contrast the rigidity of the structure. On page 59, Figure 26 shows the typical roofing connection joining the fabricated fiberglass domes to the intermediate joists and the joists to the rest of the structure via stainless joist hangers.

The site grading plan on page 60 (Figure 27) shows the designer’s topographic intent for the space depicted in the site enlargement plan on page 42. The area’s designed topography focuses runoff from the asphalt away from the school and into the wetland. On its way to the wetland, sheet flow runs across the grassed prairie areas and has a chance to infiltrate, sediment, and cleanse before finally reaching the wetland.

The images on page 61 (Figures 28-31) show photographed images of a physical model the designer built to better understand spatial relationships in the pergola planter design. The photographs convey a higher sense of realism regarding the built structure and provides additional understanding of the elevation view.
Site Planting Plan

Figure 23—Planting Plan
<table>
<thead>
<tr>
<th>KEY</th>
<th>QTY</th>
<th>BOTANICAL NAME</th>
<th>COMMON NAME</th>
<th>CONT</th>
<th>SIZE</th>
<th>SPACING</th>
<th>NOTES</th>
</tr>
</thead>
<tbody>
<tr>
<td>SHADE TREES</td>
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<td></td>
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<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>LIQ-LT</td>
<td>1</td>
<td>Liquidambar styraciflua</td>
<td>Sweetgum</td>
<td>B &amp; B</td>
<td>3'Cal</td>
<td>per plan</td>
<td></td>
</tr>
<tr>
<td>ACE-LU</td>
<td>20</td>
<td>Acer rubrum</td>
<td>Red Maple</td>
<td>B &amp; B</td>
<td>3'Cal</td>
<td>per plan</td>
<td></td>
</tr>
<tr>
<td>BET-NI</td>
<td>21</td>
<td>Betula nigra</td>
<td>River Birch</td>
<td>B &amp; B</td>
<td>3'Cal</td>
<td>per plan</td>
<td></td>
</tr>
<tr>
<td>GUE-AL</td>
<td>4</td>
<td>Quercus alba</td>
<td>White Oak</td>
<td>B &amp; B</td>
<td>3'Cal</td>
<td>per plan</td>
<td></td>
</tr>
<tr>
<td>SAL-NI</td>
<td>3</td>
<td>Salix nigra</td>
<td>Black Willow</td>
<td>B &amp; B</td>
<td>3'Cal</td>
<td>per plan</td>
<td></td>
</tr>
<tr>
<td>EVERGREEN TREES</td>
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<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>PIN-LT</td>
<td>12</td>
<td>Pinus strobus</td>
<td>White Pine</td>
<td>B &amp; B</td>
<td>8'</td>
<td>per plan</td>
<td></td>
</tr>
<tr>
<td>PIN-VI</td>
<td>10</td>
<td>Pinus virginiana</td>
<td>Virginia Pine</td>
<td>B &amp; B</td>
<td>8'</td>
<td>per plan</td>
<td></td>
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<tr>
<td>FLOWERING TREES</td>
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<tr>
<td>AME-AR</td>
<td>14</td>
<td>Amelanchier arborea</td>
<td>Downy Serviceberry</td>
<td>B &amp; B</td>
<td>2'Cal</td>
<td>per plan</td>
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<tr>
<td>GER-CA</td>
<td>45</td>
<td>Cercis canadensis</td>
<td>Eastern Redbud</td>
<td>B &amp; B</td>
<td>2'Cal</td>
<td>per plan</td>
<td></td>
</tr>
<tr>
<td>GRA-CR</td>
<td>5</td>
<td>Crotalaria cornellei 'emnem'</td>
<td>Thornless Cockspur Hawthorne</td>
<td>B &amp; B</td>
<td>2'Cal</td>
<td>per plan</td>
<td></td>
</tr>
<tr>
<td>SHRUBS</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>VIB-DT</td>
<td>39</td>
<td>Viburnum dentatum</td>
<td>Arrowwood Viburnum</td>
<td>2 gal</td>
<td>2'Cal</td>
<td>per plan</td>
<td></td>
</tr>
<tr>
<td>MAG-VI</td>
<td>3</td>
<td>Magnolia virginiana</td>
<td>Sweet Bay</td>
<td>5 gal</td>
<td>2'Cal</td>
<td>per plan</td>
<td></td>
</tr>
<tr>
<td>MOR-PE</td>
<td>20</td>
<td>Morella pennsylvanica</td>
<td>Northern Bayberry</td>
<td>2 gal</td>
<td>2'Cal</td>
<td>per plan</td>
<td></td>
</tr>
<tr>
<td>MIXES</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ANA-MI</td>
<td>750</td>
<td>Analogous Mix</td>
<td>Plugs</td>
<td>12&quot;</td>
<td>Clumps of 100</td>
<td></td>
<td></td>
</tr>
<tr>
<td>ROY-MI</td>
<td>2240</td>
<td>Aster laevis</td>
<td>Butterfly Weed</td>
<td>Plugs</td>
<td>12&quot;</td>
<td>Clumps of 100</td>
<td></td>
</tr>
<tr>
<td>OPP-MI</td>
<td>775</td>
<td>Echinacea purpurea</td>
<td>Butterfly Mix</td>
<td>Plugs</td>
<td>12&quot;</td>
<td>Clumps of 100</td>
<td></td>
</tr>
<tr>
<td>SHO-MI</td>
<td>1050</td>
<td>Bouteloua curtipendula</td>
<td>Shrub Grass Mix</td>
<td>Plugs</td>
<td>18&quot;</td>
<td>Clumps of 100</td>
<td></td>
</tr>
<tr>
<td>TALL-MI</td>
<td>190</td>
<td>Andropogon gerardi</td>
<td>Big Bluestem</td>
<td>Plugs</td>
<td>18&quot;</td>
<td>Clumps of 100</td>
<td></td>
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<tr>
<td>SOD-MI</td>
<td>58</td>
<td>Festuca arundinacea</td>
<td>Seed</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>WET-MIX</td>
<td>260</td>
<td>Sorghum bicolor</td>
<td>Three-seeded Bullshead</td>
<td>Seed</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Figure 24—Planting Schedule
Pergola Planter Elevation

Figure 25—Pergola Planter Elevation
Pergola Planter Roofing Detail

Figure 26—Pergola Planter Roofing Detail
Grading Plan
Model Photography

Figure 28—Model Aerial 'a'

Figure 29—Model Aerial 'b'

Figure 30—Model View 'a'

Figure 31—Model View 'b'
To allow children to more fairly develop their own preferences for their surrounding environments, the designer purposed to blend two areas of study: landscape architecture and psychology. Delving into both, the designer sought to master basic elements of psychology and use his own understanding of landscape architecture as the basis for design work. After researching the mere exposure effect, conditioning, and preference development, contrast and juxtaposition became important foundations for further development. Despite a relatively small site, the project’s scope extends much further than the property line. Due to the somewhat exploratory nature of the project, the designer undertook extensive research to understand the connection between design and preference.

Design development resulted in three plausible site solutions which each aimed to resolve East Washington Academy’s unique needs while also delivering on children’s need to develop their own environmental preferences. The final master plan resolves to blend built and natural elements in close proximity to each other so their contrasts are made more evident to the school children. Critiques of this design worried that deliberately mingling the two types of elements in one landscape might produce an unexpected outcome; children might learn to prefer a landscape that mixes built and natural elements, and not develop a true affinity for one or the other. While this outcome was not the intended result of the project, its actualization would not be unwelcomed by the designer.

There is little research known to the designer (beyond that outlined in the literature review) that explains how preferences are developed through interactions with the landscape. Consequently, to understand whether or not the final master plan delivers on the project’s lofty scope, extensive on-site observations, interviews, and analysis would need to be conducted. With similar studies as precedents, these observations would likely include children’s upbringing, preconceived opinions of their surroundings, amount of exposure to the school landscape, age, and gender. In theory, the final design solution appropriately responds to the problems originally set out, but with little conclusive research in the topic area being applied directly to landscape design, further investigation is needed. In furthering the project, the designer hopes East Washington Academy will identify funding sources and follow through in partnering with local organizations to build the project and ultimately gauge the successfullness of the design through children’s interactions with it.
Appendix A: Site Photography
Appendix B:  
East Washington Academy Enrollment

Enrollment Statistics
Ethnicity Breakdown
East Washington Academy Students are 67.72% White, 0.39% Hispanic, 1.57% American Indian, 27.17% African American and 3.15% Asian/Pacific Islander.

Male - Female Ratio
East Washington Academy Students are 47.64% Female and 52.36% Male.
Enrollment By Grade

- Kindergarten: 44 (15.44%)
- Second Grade: 35 (12.28%)
- Fourth Grade: 54 (18.95%)
- First Grade: 46 (16.14%)
- Third Grade: 57 (20.00%)
- Fifth Grade: 49 (17.19%)

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