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The Use and Perceived Value of Shade Trees in Thirty-two Childcare Facilities in a Middle Tennessee County

Karla Kristine Kean
University of Tennessee, Knoxville

To the Graduate Council:

I am submitting herewith a thesis written by Karla Kristine Kean entitled "The Use and Perceived Value of Shade Trees in Thirty-two Childcare Facilities in a Middle Tennessee County." I have examined the final electronic copy of this thesis for form and content and recommend that it be accepted in partial fulfillment of the requirements for the degree of Master of Science, with a major in Agriculture and Extension Education.

Randol G. Waters, Major Professor

We have read this thesis and recommend its acceptance:

Accepted for the Council:
Carolyn R. Hodges

Vice Provost and Dean of the Graduate School

(Original signatures are on file with official student records.)

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Sue Hamilton

Darren K. Robinson

Darren Robinson

Acceptance for the Council:

Vice Chancellor and
Dean of Graduate Studies

The Use and Perceived Value of Shade Trees in Thirty-two Childcare Facilities in a Middle Tennessee County

A Thesis
Presented for the
Master of Science
Degree
The University of Tennessee, Knoxville

Karla Kristine Kean
December 2004

DEDICATION

This paper is dedicated in loving memory of my father, Ralph Gargus, who instilled within me a love for trees, nature and wildlife. As a young child, my playground was the forest and my jungle-gym, the trees. And to my mother, for memories of picking violets by the roadside in springtime, May Day Baskets, and for her patience when I picked her white peonies, put them in colored water then watched the petals take on the color of the water! All these memories of my childhood are important components of the person I am today. Additionally, I would like to dedicate this to my husband Willis, and my children Amber, Christina & Patrick, who were strong and supportive of my venture into higher education. Thank you for all the sacrifices made, for believing in me, and for always encouraging me to reach for higher goals.

I wish all children access to "my playground" and challenge schools, daycare centers, and communities to restore children's natural outdoor play spaces.

-This ecstacy overtook me when I was happy out of doors. Was I five or six? Certainly not seven. It was a morning in early summer. A silver haze shimmered and trembled over the lime trees. The air was laden with their fragrance. The temperature was like a caress. I remember– I need not recall– that I climbed up a tree stump and felt suddenly immersed in Itness. I did not call it by that name. I had no need for words. It and I were one.

Bernard Berenson, Sketch for a Self Portrait

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Special thanks is expressed to the Montgomery County Agricultural Extension Committee and my county Extension Leader, Mr. John Bartee, for granting permission to be out of the county during this time of study. And, much gratitude is conveyed to Martha Martin Pile for her direction, incentive and commitment to this study.

In closing, I would like to thank all of my family, friends and co-workers whose suggestions, encouragement, prayers, and patience made this work possible.

ABSTRACT

Outdoor childcare play areas could benefit from shaded areas, or additional shaded areas, not only for protecting children from the sun, but in providing them a rich learning environment as well. Trees provide shade, clean air and opportunities to develop environmental responsibility though visual and cognitive interaction with nature. Worldwide, researchers are delving into a fast emerging field of childhood studies which looks at the importance of trees, nature, and their effects on children's play and learning.

Incorporation of trees into outdoor play spaces will lead us into the direction of ensuring continuing appreciation of the environment as well as providing beneficial shade for future generations. Study results indicate a high value associated to the importance of shade trees in outdoor play spaces; yet, physical site assessment data reveals a low number of shade trees compared to the presence of standard play equipment. Oftentimes, playground development is considered the least important factor when budgeting for improvements to the overall center. While nature-based activities and curriculum are being conducted indoors, outdoor environments are overlooked as opportunities to improve cognitive skills.

An educational model has been created for the development, implementation and evaluation of shade tree use in childcare centers. This model will be used to implement and assess the impact of an educational program on attitude about and knowledge of use of shade trees in childcare facilities.

PREFACE

This study illustrates the current knowledge and attitude of childcare directors and teachers regarding shade trees and other vegetation in outdoor play spaces, how that space is used, and how much quality time a child can spend outdoors during the hottest months of the year.

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CHAPTER I: INTRODUCTION

The purpose of this study was to determine the attitude of childcare providers regarding the perceived value of shade trees, child play habits and facility design considerations of outdoor play spaces. This project serves as a template, usable to promote adoption of shade considerations in outdoor child play areas in other counties in Tennessee and abroad. This research was conducted to: (a) determine attitude of childcare center directors toward providing shade by planting trees in outdoor play areas, (b) heighten awareness and knowledge of shade tree value and use in childcare centers to improve outdoor learning environment and usable outdoor space, and increase time children can comfortably utilize outdoor play spaces, (c) determine the need to plant shade trees that will grow and provide adequate shade in outdoor play areas for future generations, and, (d) create a model for the development, implementation, and evaluation of shade tree use in childcare facilities.

A data collection tool developed by Darnell B.W., Livingston M., and Macmillian-Johnson L., was used to measure vegetation values in the context of developmentally appropriate early childhood education based on Potential Play Value of Vegetation (PPVV) of existing vegetation and educators perceived value of vegetation.

GENERAL STATEMENT OF THE PROBLEM

The current paradigm in playground design is to pick up a catalog, select various pieces of equipment, and place it on an approved surface area. Then, a few times a day, the children are let out to play on one dimensional, non-moveable equipment that has been placed out in the full sun. Among childcare directors and teachers there is: lack of awareness of the benefits of shade in child play areas, lack of knowledge in planning and designing facilities to include adequate shade, and lack of knowledge of how to select, implement and care for shade trees.

Those of us who spent all our lives around trees, know how important trees are to our own society development and to the world. The time has come to quit talking about it and write it down! Document it so that others may benefit from the results.

NEED FOR STUDY

Despite widespread knowledge of what is needed to provide quality in early childhood programs, many programs fail to do so. Outdoor childcare or play facilities could benefit from shaded areas, or additional shaded areas, for not only protecting children from the sun, but in providing them with a rich learning environment. The interest shown in the beautification of homes is rarely given to childcare facilities, which often is an aesthetic "no man's land," where beauty and comfort are deemed costly luxuries (Olds, 1989). The childcare centers are not regulated to have trees, and like many things, if the regulatory agencies have not told them to do it, they [childcare providers] are

not going to do it for fear of being wrong.

As more children are cared for in daycare centers, childcare providers need to evaluate their sun protection practices (Tondl, 1999). One of the greatest changes in American family life over recent years is the mounting participation of young children in nonparental childcare and early education settings. A child who enters the childcare environment as an infant and continues through the elementary years, is likely to spend more than 12,000 hours in that center. During these early learning years, the physical environment and surroundings shape a child's intellect and therefore, should support and assist rather than impede the learning process.

Establishing a childcare center is not as simple as locating property and putting up a sign. The design and layout of the physical environment which includes the building, interior finishes, outdoor spaces, room arrangement and selection of equipment have profound impact on children's behavior (Stoecklin, 1999). The participatory design process involves communication between owners, architects and other design specialist to establish goals, budget, organization, planning and implementation. It is essential to find out goals and values of teachers, parents, children and others involved in the overall program.

STUDY OBJECTIVES

Through this study the research has accomplished the following objectives:

- Determine attitude of childcare center directors toward providing shade by planting trees in outdoor play spaces.
- Heighten awareness and knowledge of shade tree value and use in childcare centers to improve outdoor learning environment, increase time children can comfortably utilize outdoor play spaces, increase the quality of outdoor activities, and increase the time children can play outdoors by providing shade during the hottest part of the day.
- Determine the need to plant shade trees and other vegetation that will grow and provide adequate shade in outdoor play areas for future generations.
- Create a model for the development, implementation and evaluation of shade tree use in childcare facilities. This model will be used to assess the impact of an educational program on attitude about and knowledge of use of shade trees in childcare facilities through post-test results.

STUDY SCOPE

This study provides an analysis of the current standards in playground design in relation to the current attitude of childcare providers regarding the perceived importance of shade trees in outdoor play spaces in childcare centers. The literature review provides information on the fast emerging field of childhood studies examining the importance of trees, nature and children.

Diversified examples of research studies are referenced within the literature review to accentuate the benefits of shade trees, emphasizing the importance of this study, and the significance of future replication.

DEFINITION OF TERMS

Americans with Disabilities Act (ADA): a Federal Civil Rights Legislation that prohibits discrimination and ensures equal opportunity for persons with disabilities in employment, state and local government services, public accommodations, commercial facilities and transportation. ADA is administered by the US Department of Justice.

Architect: a person who designs buildings and advises in their construction.

Biophilla: genetically based human need to affiliate with nature.

Biophobia: "an aversion to nature"; discomfort in natural places; scorn for anything that is not man-made.

FIDCR: Federal Interagency Day Care Requirements

Interior Designer: a person who specializes in interior design.

International Society of Arboriculture: organization whose mission is to foster a greater appreciation for trees to promote the research, technology, and practices of professional arboriculture.

Landscape Architect: a person who develops land for human use and enjoyment through effective placement of structures, vehicular and pedestrian ways, and plantings.

Landscape Designer: a person trained in the art of design and science of

growing horticultural plants.

NAEYC: National Association for the Education of Young Children

Participatory Design: having children, teachers, parents and maintenance staff participate in the design process.

Sun Protection Factor (SPF): the degree to which a sun-screen, suntan lotion, or similar product, protects the skin form ultraviolet rays; usually expressed numerically.

Universal Design: an approach to the design of products and environments so they can be used by all people, to the greatest extent possible, without the need for adaptation or specialized design.

UV Index: a measure of the intensity of the suns ultraviolet radiation in the sun burning spectrums.

Ultraviolet Radiation (UV): is a form of radiation which cannot be seen by the human eye. UV radiation is very dangerous to your skin and can cause sunburn, skin cancer and premature aging of the skin.

- **UVA** rays are a type of UV radiation. All of this type reaches the earth and along with UVB causes skin cancer.
- **UVB** rays are a type of UV radiation. Most of this type reaches the surface of the earth, making this form damaging to the skin.
- **UVC** rays are a form of UV radiation that does not reach the earth's surface.

CHAPTER II: REVIEW OF LITERATURE

INTRODUCTION

The significance of shade trees and the attitude of people toward that value is difficult to measure in quantitative terms. Attitudes develop over time and often originate from the environment in which one is raised, such as urban locales compared to rural vicinities. The knowledge-attitude-behavior change model described by Matthews and Riley (1995) holds that an increase in knowledge will lead to a change in attitude which will in turn influence behavior. Researchers with the University of Southern Denmark (2000) raised the following questions: "What are the cultural meanings and social effects of buildings and other settings designed for and used by children? Is there such a thing as a child's space or children's landscape? With these kinds of questions in mind, we inquire into a field rapidly emerging in childhood studies, the architecture and material culture of children."

Prior studies suggest that a human's innate love for nature is being replaced by biophobia, a fear of nature (Wilson, R.A., 1997) brought on by a wave of contentious attitudes. Studies also show that children's opportunities for direct experiences with nature are shrinking, and that the consequences to their development as well as to the environment could be devastating (Wilson E.O., 1997; Moore, 1997; Kellert, 2001). Natural environments stimulate social interaction between children (Moore, 1986, Bixler et al. 2002) as well as all aspects of child development more readily than indoor environments (Moore &

Wong, 1997). Over one-hundred studies of outdoor experiences in the wilderness and natural areas show that natural environments produce positive physiological and psychological responses in humans, including reduced stress and a general feeling of well-being (Lewis, 1996).

Through this literature review we will examine the following information:

- The Value and Benefit of Trees to Children's Learning Ability
- The Value and Benefit of Trees to the Overall Environment
- Sun Protection Practices and Playground Safety Concerns
- Licensing and Regulation Issues
- Relevant Studies Supporting Nature in Early Childhood Education
- Conclusion

VALUE AND BENEFIT OF TREES TO CHILDREN'S LEARNING ABILITY

A small but growing body of research indicates that daily experience of nature, spending time outdoors in the fresh air and sunlight, in touch with plants and animals, has measurable impact on healthy child development (Moore and Cosco, 2002). Limiting a child's play to simply gross motor skill development forgoes the opportunity to foster creative play involving sensory and social skill development. Climbing a low tree, crawling through a barrel, or chasing soap bubbles are all activities preschoolers enjoy and need to develop their growing arm and leg muscles (Wiggins, 1996). While the very word "play" has connotations of aimlessness or entertainment that often

conflict with educational goals (DeVries et al., 2002), play is the investigative process by which young children construct knowledge and is central to the concept of developmentally appropriate practice advocated by the National Association for the Education of Young Children (NAEYC) (Bredekamp and Copple, 1997).

The power of nature can have profound effects on children's cognitive development (Wells, 2000). Wiggins (1996) contends that, "All children like to play outdoors. Grass feels good between bare toes. Gentle slopes are wonderful to roll down time and again. Soft dirt is ideal for digging. Flowers are fun to smell and pick." Wiggins further states, "A sandbox can be lots of fun, but a special place to dig in the dirt can be just as interesting (1996)." Through personal communication, one horticulturist from the Netherlands stressed that every child care center needs sunny as well as shady places. For example, the sandpit is an important spot to have shaded because otherwise it will get very hot for play in the summertime.

Trancik and Evans (1995) suggest that the design of day care settings should include spaces supporting "restoration," such as natural areas, because preschool children may be susceptible to mental fatigue as they adapt to a new preschool environment. Research on children's preferences shows that if children had the design skills to do so, their creations would be completely different from designed playgrounds typical at most childcare facilities. Outdoor spaces designed by children would be fully naturalized

with plants, trees, flowers, water, dirt, sand, mud, animals, and insects (White & Stoecklin, 1998).

Trees are essential for kids (Mooreland, 2001). A mature tree, for example, is in a state of constant change. Throughout the day the wind moves the leaves, which in turn cast varying shadows on the ground. The changing colors of fall leaves, the flowers and fruit of summer, each provide important lessons (Designing for Development, 1997). A tree can be anything in a child's imagination! One moment it may be first base, the next it may be a fort to hide behind or a quiet place to sit.

Outdoor play space is a critical component of early childhood education and should be an extension of the indoor curriculum, not separate from it. Just as indoor areas of the childcare centers are divided into zones, so should be the outdoor play area. Rather than having a large open space with pieces of equipment here and there, build discovery zones made from plants, benches and other natural elements? Guddemi and Erikson (1992) suggest five zones of activities: nature, adventure play, active play, quiet learning, and quiet play. To exemplify this theory, Mary Rivkin (1995) writes that in the same way a rug in the classroom can serve as a book reading place at one time and as a circle gathering area or a dancing spot at another time, a particular outdoor area can suit several purposes. Consequently, nature and vegetation were central to the curriculum of first early childhood educators (Herrington, 2001). Unfortunately, the standard consists of prefab equipment which offers no more

than gross motor skill development. A quality play environment should offer many opportunities for all aspects of development including sensory experiences, social interaction, imagination, and general well- being. The traditional playground, with nonmovable steep play equipment, has been criticized for being one-dimensional, anchored, and with no natural landscaping (Datner, 1969; Frost & Klein, 1979).

VALUE AND BENEFIT OF TREES TO THE OVERALL ENVIRONMENT

On a warm summer day, the air in the city can be six - eight degrees Fahrenheit hotter than surrounding areas without trees (Kimmerer, n.d.). Trees planted in neighborhoods can save money on energy costs, decrease storm water-runoff, and offset air pollution. In a study released in 2001, American Forests found that tree cover in the Atlanta area saved residents approximately $2.8 million annually in reduced energy bills. Similar trends are being identified in cities around the country. Observation is the best way to determine where to plant to maximize shade. Plant where you want the shadow during the hottest time of the year and the time of day you desire the shade (National Arbor Day Foundation, 1992). Tondle (1999) recommends practicing the shadow rule: look for the shade when your shadow is shorter than you are tall.

The National Program for Playground Safety (2002) contends that, the quality of shade an object receives depends on the sun's position in the sky, the size of the object making the shadow, and how much sunlight can

penetrate the object. The National Arbor Day Foundation (1992) recommends following these steps when selecting and planting trees:

- think clearly about the purpose of your new tree; will it provide privacy, shade, windbreak, aesthetics?
- write down the limitations of your site; note overhead wires, underground utilities, a confined root zone, clay soil . . .
- select species or cultivar to plant that best matches the above conditions
- examine trees before you buy, and buy for quality

Plant deciduous trees on the east and west sides of a house to produce the best shade during summer mornings and afternoons, while minimizing unwanted winter shade (Saul, 2002). Saul also states that, "Since the sun is directly overhead in the summer, trees planted on the south won't provide much shade unless planted very close the house." Furthermore, Spedding (1993), recommends that if there is not natural shade, make your own by using well secured tents or canopies. Shrubs may also be used to block the early-morning and late afternoon sun on eastern and western exposures, respectively (Meerow and Black, 1993).

SUN PROTECTION PRACTICES AND SAFETY CONCERNS

The U. S. Consumer Product Safety Commission (CPSC) (1999) reports that there are twenty-one million children under age six in this country with almost thirteen million of them placed in nonparental childcare during some

portion of the day. For children less than six, playground related injuries (about 900,000) each year account for more visits to U. S. hospital emergency rooms than any other childcare related injuries; furthermore, most injuries occur when a child falls from the equipment onto the ground (CPSC, 1999).

Playground safety is only one concern. It is estimated that 80% of total lifetime sun exposure occurs in the first eighteen years of life. According to the American Cancer Society (2002), skin cancer is one of two preventable cancers that is currently on the rise! Previous studies conducted by the American Academy of Dermatology (2000) have confirmed that sun exposure is responsible for the development of at least two-thirds of all melanomas. Current data indicates that a child who enters a daycare setting as an infant and stays through elementary school age will log more than 12,000 hours at that daycare center.

The Center for Disease Control (CDC) (1997) states that overexposure to the sun's harmful rays during childhood has been linked to skin and other cancers later in life. Recommendations from the CDC to reduce injuries caused by heat and sun include:

- limit the time that children spend outdoors during the hottest part of the day (10:00 am - 2:00 pm)
- require parents to provide sun block lotion with a sun protection factor (SPF) of at least 15 if children will be spending more than a few minutes in the sun

- provide caffeine free drinks for children before and after outdoor play
- require that children wear protective clothing if they will be exposed to the sun for extended periods, such as on outdoor field trips. Hats or sun visors, long-sleeved shirts and pants, and sun block lotion will prevent burns to sensitive skin.

Tondl (1999) asserts that, "protection from the sun should be considered as necessary as providing a balanced diet; furthermore, daycare providers and parents need to understand the importance of sun safety practice in relation to the long-term incidence of skin cancer in the children they serve." Ultraviolet rays from the sun can penetrate through most lightweight clothing such as a typical cotton T-shirt allowing dangerous UV rays access to the skin (Tondl, 1999). Since children learn through role modeling and example, childcare providers and parents need to examine their own attitudes and practices related to sun exposure (Tondl, 1999).

Vegetation helps us to sustain life. Unfortunately, some of the plants found in our landscapes may be tempting to young children, but are dangerous to eat. Hagen (2003) cautions that children may be especially tempted to pick and eat berries if they have seen their parent picking berries such as blackberries, blueberries, and strawberries over the course of a summer. Many plants have berries, leaves or stems that may be toxic if ingested or simply irritating to the touch. It is best to check with the local

county Extension Agent for a list of poisonous plants relative to your part of the country. Hagen (2003) proclaims, "We cannot ignore plants, for they are the hand that feeds us. However, common sense can go a long way in making people-plant relationships a compatible one."

RELEVANT STUDIES SUPPORTING NATURE IN EARLY CHILDHOOD EDUCATION

A study entitled, *Outside in all Weather Conditions*, conducted in Sweden compared the effects of natural environments on children within two different day care settings (Grahn, Martensson, Lindblad, Nilsson, & Ekman, 1997). Results demonstrated that children in the more natural daycare had better motor coordination and better attentional concentration abilities (as measured by the Attention Deficit Disorders Evaluation Scale [ADDES], (McCarney, 1995). Even the most imaginative child will find it difficult to be creative and sociable in a bleak, sterile space for a quarter of every school day (Titman, 1994).

According to Fabor-Taylor, et. al (1998), the USDA Forest Service, Southwestern Center for Urban Forestry (SWCUF) found that amount of vegetation in outdoor spaces influences not only the amount of play, but also the quality of play. They discovered that nearly twice as many children were playing in spaces with many trees as in the more barren spaces and were especially engaging in the type of creative play that foster language and collaborative skills. Study results illustrate that children and adults are more

likely to cooperatively occupy the same space when higher levels of vegetation are present. Moreover the results substantiate the premise that presence of trees and vegetation in outdoor public spaces was associated with greater use of these spaces by both youth and adults. In addition, children playing in highly vegetated areas were more likely to be under adult supervision.

Fabor-Taylor et al, (2001) found that symptoms of Attention Deficit Disorder (ADD) in children were relieved after contact with nature. They found that children, like adults, become fatigued from concentration on schoolwork and structured activities and need to refresh their ability to pay attention. Study participants were children that had been previously diagnosed with ADD by a physician. Research findings indicate that the amount of greenery in the child's daily environment did not correspond with milder ADD symptoms in general; however, when compared to the subsequent effects of play in paved outdoor or indoor areas, activities in natural, green settings were far more likely to leave ADD children better able to focus, concentrate and pay attention. Activities that occur indoors or outdoors in spaces devoid of greenery were more likely to leave ADD children agitated and less able to concentrate. The findings point to a compelling use of outdoor play in green settings to help ADD kids function better.

Fabor-Taylor et al, (2002), found that girls with a home view of nature scored higher on tests of self-discipline which enables them to better avoid

dangerous, unhealthy or problem behaviors, and behave in ways that foster life success.

Great variation in vegetation and diversity of natural features in man study sites suggests that the National Association for the Education of Young Children (NAEYC) accreditation criteria may not be addressing the quality of "naturalness" in outdoor environments, and subsequently not providing adequate teacher training about the topic (Darnell B.W., Livingston M., and Macmillian-Johnson L., 2003).

LICENSING AND REGULATION ISSUES

Despite extensive knowledge of what is needed to provide quality care in early childhood, many programs fail to do so. While licensing systems seek to reduce possible harmful environments in childcare centers, regulatory systems in many states are not adequately supported and therefore unable to completely protect children's healthy development and learning. The National Association for the Education of Young Children, in collaboration with the National Health and Safety Performance Standards (1997), have identified five issues exemplifying the lack of support:

1. Some states set their basic floor of protection too low, failing to reflect research findings about the factors that create risk or harm;
2. A large number of settings in some states are exempt from regulation;

3. The licensing office in some states is not empowered to adequately enforce the rules;
4. Multiple regulatory systems may apply to individual programs, sometimes with resulting overlapping or even contradictory requirements; and
5. Policymakers may view licensing as unnecessary because they believe it seeks the ideal or imposes an elitist definition of quality rather than establishing a baseline of protection.

The Tennessee Licensure Rules for Childcare Centers Serving School Age Children, 1240-46-.09 Program (February 2003, revised), states that, "Opportunity for outdoor play shall be provided for all children who are in care for more than three consecutive daylight hours. Staff shall actively interact with children during outdoor play. (Exception: For inner city centers where outdoor play is prohibitive or dangerous, unoccupied indoor space providing fifty [50] square feet per child is acceptable."

This same document goes on to report that a daily program shall provide opportunities for learning, self-expression, and participation in a variety of creative activities such as art, music, literature, dramatic play, science, and health (Tennessee Licensure Rules for Childcare Centers Serving School Age Children, 1240-46-.09 Program, February 2003, revised). Nowhere in this document does it say that these learning activities have to be conducted indoors; yet, it seems that inspectors concentrate their efforts on the indoor environment. For example, the Three Star Rating System validators

may give positive credit for having trees in the play area; whereas, the Health Department may come in and give a lower score because the tree's roots are exposed as a tripping hazard. Unfortunately, this lack of support and contradictory requirements from licensing agencies keep many centers at minimum standards and fearful of going beyond the mandates. This is a realm where interpretation of data is subjective to the opinion of the inspector.

CONCLUSION

Clearly there is a need for coordination of licensing rules and communication among agencies that develop such guidelines and focus on research practices that most clearly demonstrate a benefit to those providing early childhood services. Childcare providers in general are knowledgeable of early childhood education subject matter, while lacking in horticulture instruction or background. Presumably, if a person lacks interest or holds a negative attitude toward nature/gardening activities, their curriculum and programs will reflect that attitude. According to Fox and Lautt (1996), it is time to take a step beyond effecting and measuring short-term behavioral changes. Additionally, they recommend that conducting more longitudal outcome-based research would provide much needed documentation of the success of outdoor education in developing environmental responsibility.

Numerous research studies have confirmed the fact that greenery fosters creative play, improves children's access to adult interaction, and improves peoples general well being. Stoecklin (2000), insists that new kinds of outdoor play, while they do not require more money, do require more

involvement from the people who will play in and care for the discovery play garden. Having children, teachers, parents and maintenance staff participate in the design process is essential.

CHAPTER III: PROCEDURES AND METHODOLOGY

STUDY DESIGN

This study was conducted using qualitative, descriptive research methods to investigate the current attitude of childcare directors towards shade trees on playgrounds and examine existing outdoor play space design considerations. Childcare center sites are not identified by name in the study as participation was voluntary and represents a variety of ethnic and socioeconomic backgrounds of people. All sites care for children ranging from infant to school-age (6 weeks - roughly 12 years). The researcher utilized surveys, direct observation, a data collection sheet, physical site assessments, and interviews to investigate the issue. A survey was also sent to teachers working in the study centers, however, due to lack of response that information has been pulled from the final analysis.

THREATS TO VALIDITY

While this study attempts to quantify data such as attitude, current knowledge and potential play values, it is primarily qualitative in nature, and results based on qualitative data are not conclusive due to inductive reasoning. Qualitative data is based on what we see, hear, and feel during direct observation without bias; furthermore, this type of data can be used to identify possible trends regarding use of shade trees and other vegetation in childcare centers outdoor play spaces. While opportunities for bias exist throughout the study, every attempt has been made to either eliminate or acknowledge them.

Survey non-respondents were eliminated from the study, thus limiting results only to voluntary respondents. The interview and survey process is based on individual judgement and the interpretation of responses may contain bias. During the focus group meeting, an interview guide was utilized which increased the comprehensiveness of the data and makes data collection somewhat systematic for each respondent. Topics and issues to be covered were specified in advance in outline form. One can expect that important and pointed topics may be unintentionally omitted from discussion and the interviewers wording of questions may result in different perspectives, thus reducing the comparability of responses.

A persons' attitude can be defined as, "the measure of a person's complex set of beliefs, feelings, and behavioral tendencies about another person or thing." The origin of attitude develops by actual experience with an object, association with similar objects, and is a social learning process. Surveying both directors and teachers in contrast to directors only revealed a variety of responses. Parents, children and maintenance personnel were not included in the survey process. Personal interviews during site assessment were conducted with either directors, assistant directors or teachers, whoever was available at the time. This lends to the assumption that the person interviewed was the most knowledgeable about the values and goals of the center. In several situations, children were not actively involved in outdoor play, thus eliminating observation of interaction between children and vegetation.

POPULATION AND SAMPLE

In May 2003, two-hundred *Baseline Surveys for Childcare Directors* (Appendix A) were sent to a population of two-hundred childcare center directors in Montgomery County, including Clarksville and Ft. Campbell, as well as select centers located in surrounding counties of Cheatham, Stewart and Houston. Thirty-two childcare center directors completed and returned the initial survey and thus, were selected to participate in the study. A follow-up, baseline survey for teachers was sent to each of the thirty-two centers, but less than half of the centers' teachers returned their surveys. Without response from all teachers at all centers, the input from teachers was deemed insignificant to this study; however, pertinent comments from teachers were utilized in the individual site narratives.

DEMOGRAPHIC DATA

Demographic data reflecting educational levels of childcare center directors indicates that 41% hold high-school Degrees or G.E.D certificates, 37.5% retain either Bachelors or Masters of Science Degrees, 3% hold Associates Degrees, 12.5% hold Child Development Associate (C.D.A) certification, and 6% have less than a high school education. Socioeconomic status reported by directors shows that the largest sector (71%) are located in middle income areas, followed by low income (25%), with only 4% reported as high income; furthermore, data collected indicates that 63% of centers studied were in urban areas with 37% rural. The median income in Clarksville is $33,655 annually with the average wage of $24, 319, and low income/poverty

and below is $15,000 for a family of three.

Of participating centers, 90%, participate in the State of Tennessee Voluntary Star Quality Childcare Program (rated licensing system) with 70% reporting an overall rating of three. If a center or home volunteer's to participate in this program, the overall score from the assessment converts to one, two, or three stars for the provider, which in turn can increase the providers' state reimbursement by 5, 10, or 15%, respectively (State of Tennessee, 2003).

DATA COLLECTION

Data collection began in February 2003 with input received from one focus group meeting. The parties invited offered knowledge in landscape design, early childhood education, horticulture, environmental curriculum development and community involvement. Representatives from the State of Tennessee voluntary Star Quality Childcare Program (rated licensing system) and Department of Health and Human Services, who set regulations for said childcare centers, were invited but chose not to attend, thus relinquishing access to their valuable knowledge and opinions. Participants engaged openly in discussion guided by the researcher who developed a series of predetermined questions (Appendix B). Information regarding demographics, attitude and perceived knowledge of shade trees were calculated through information given on the baseline survey for childcare directors.

The physical site analysis was limited to the outdoor play area(s) which varied in size from 26,000 square feet to 1,200 square feet (Table 1).

Table 1. Site Information for Thirty-Two Childcare Centers in a Middle Tennessee County

Site #	Location	Play Space Square Footage	Funding	Facility Type	# Play Areas	Nearby Open Space Used/Play
1	central	9,900	Private	self-contained	1	yes
2	southwest	5,300	Public	self-contained	3	no
3	northeast	12,400	Public	self-contained	2	yes
4	north	11,800	Public	self-contained	2	yes
5	northeast	10,000	Public	self-contained	1	no
6	north	10,000	Private	self-contained	1	no
7	northeast	2,000	Public	self-contained	1	no
8	northeast	10,000	Public	self-contained	1	no
9	southeast	26,500	Public	self-contained	2	yes
10	southwest	1100	Public	self-contained	2	yes
11	southwest	10,000	Public	self-contained	1	yes
12	southwest	29,600	Private	self-contained	2	no
13	central	6,669	Private	self-contained	2	yes
14	south	15,000	Public	self-contained	2	no
15	northwest	10,000	Public	self-contained	1	yes
16	southwest	1,000	Private	home	1	no
17	south	18,750	Private	home	2	yes
18	north	7,000	Private	home	1	no
19	north	5,100	Public	self-contained	2	yes
20	north	5,000	Public	self-contained	2	yes
21	north	5,000	Public	self-contained	1	yes
22	northwest	15,000	Private	home	1	no
23	northwest	3,360	Private	home	1	no
24	northeast	2,500	Private	home	1	no
25	northeast	2,400	Gov't	self-contained	1	no
26	northwest	4,800	Gov't	self-contained	1	no
27	north	2,500	Private	home	1	no
28	northwest	25,000	Public	self-contained	3	yes
29	northwest	1,000	Public	self-contained	1	yes
30	northwest	1,200	Public	home	1	no
31	south	15,000	Private	home	1	yes
32	southwest	15,000	Public	self-contained	1	no

Throughout the months of July and August 2003, the researcher conducted physical site assessments of outdoor play spaces to further investigate the attitudes of childcare directors toward planting shade trees on outdoor play areas, to identify the amount of existing vegetation and growth structure diversity, and types of outdoor curriculum being utilized. Individual sites were evaluated using a two-part assessment. Part I consisted of a physical site assessment utilizing a data collection sheet (Table 2) to identify what type of vegetation existed, as well as natural and built elements in the outdoor play spaces. As each species was identified and recorded on the data collection sheet, the researcher evaluated the potential play value of vegetation (PPVV) by comparing the vegetation's characteristics to those nineteen values listed on the (PPVV) index (Table 3). Part II, consisted of structured interview questions (listed in the data collection sheet) to the director of each site to determine their attitude and opinions of the value of shade trees and other vegetation in childcare outdoor play spaces.

Table 2. Data Collection Sheet

Site Name and #: **Date of assessment:**

Type of Facility: classroom in school, self-contained building, self-contained portable, other:

Approximate sq. footage of outdoor play area:

Total # of plants:

# of native species:

Lawn: yes no **Condition**: good medium poor

Outdoor Garden: yes no Type: container, in-ground, other:

Other natural elements present: sand, wood chips, boulders, water, stones, other:

Built elements: permanent all-in-one equipment, permanent equipment pieces, stored equipment, shade structures, other:

Plant Species Name	Type	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S
Example: *Red Maple*	*Tree (T)*	*x*	*x*	*x*	*0*	*0*	*x*	*x*	*x*	*x*	*x*	*x*	*x*	*x*	*x*	*x*	*x*	*x*	*x*	*x*

DATA COLLECTION SHEET INTERVIEW QUESTIONS

Interactions between children and vegetation spontaneously observed or related by teacher? Yes No, describe:

Questions for directors/lead teachers: Teacher or director name: (optional)

1. How do you believe vegetation can contribute and be valuable to an outdoor play area for young children?
2. What do you do in your curriculum to teach children about plants, nature and the environment?(Outdoor play, gardening, books, science table, other)
3. How many opportunities do you believe the children in your program have to play outdoors outside school? (Many, Few, Some) Comments:

Table 3. Potential Play Value of Vegetation Index: Plant characteristics that provide potential play values (PPV) and references.

Letter	Potential Play Value (PPV)	Plant Characteristic Providing Value	Reference
A	Provides physical comfort	Modifies climate (provide shade/reduce wind)	Moore, Olds
B	Provides beauty	Appears well-maintained	Moore, Olds
C	Provides unusual texture	Foliage, bark, leaves	Moore, Herrington
D	Provides edible parts	Produces edible parts	Francis, M., Moore
E	Provides fragrance	Produces fragrant flowers/foliage	Moore
F	Provides sound	Produces parts/create sounds	Moore
G	Provides color	Produces colorful flowers/foliage	Moore
H	Provides landmark/focal point	Exhibits distinctive form	Moore, Olds
I	Provides parts for manipulative play	Produces regenerating parts, i.e. seeds, pods, or flowers	Moore, Rivkin, Herrington
J	Provides structure for safe climbing/swing attachment	Supports climbing/swings	Moore, Francis
L	Attracts wildlife	Provides food/shelter for wildlife	Moore, Rivkin, Wilson
M	Shows passage of seasons	Exhibits noticeable seasonal changes	Moore, Olds
N	Contributes to regional or cultural identity	Distinctive of region	Moore, Herrington
O	Is safe for young children	Not toxic or dangerously thorny	Moore, Herrington
P	Does not create significant maintenance problems	Requires minimal pruning/irrigation	Schuler, Jones
Q	Is accessible to children	Exhibits features at a young child's scale	Francis, Moore
R	Is well-maintained	Appears healthy and is actively growing	Cooper-Marcus and Barnes, Moore
S	Is intentionally planted	Appears to be planted in relation to potential use by children	Moore, Herrington

CHAPTER IV: INTERPRETATION OF DATA

This study has been conducted with these objectives in mind.

Objective One: Determine attitude of childcare center directors toward providing shade by planting trees in outdoor play spaces.

Objective Two: Create awareness to achieve change in knowledge of childcare directors to improve the outdoor learning environment by increasing the usable outdoor space, quality of outdoor activities, and increasing the time children can play outdoors by providing shade during the hottest part of the day.

Objective Three: Determine the need to plant shade trees and other vegetation that will grow and provide shade as well as a rich learning environment in outdoor play areas for future generations.

Objective Four: Create a model for the development, implementation and evaluation of shade tree use in childcare facilities. This model will be used to assess the impact of an educational program on attitude about and knowledge of use of shade trees in childcare facilities through post-test results.

OBJECTIVE ONE

Determine attitude of childcare center directors toward providing shade by planting trees in outdoor play spaces.

Final reports suggest that attitudes of childcare providers toward providing shade by planting trees are quite diverse. Using the Baseline Survey for Childcare Directors, the researcher began measuring current attitudes by asking directors to indicate the current conditions of outdoor play areas. Question number eight on the baseline survey asked, " How would you rate the overall quality of the outdoor play spaces of your center. Responses could range from "Excellent" to "Needs Improvement." As seen in Table 4, two centers indicated their outdoor play spaces were in "excellent condition", twelve indicated "very good", eleven indicated "good", none selected "fair", four indicated their play areas "need improvement", and there were three non-respondents.

The baseline survey for childcare directors, question number sixteen, sought to determine the attitude of childcare center directors toward providing shade by planting trees in outdoor play spaces by asking, "In your opinion, rate the importance of trees in outdoor play spaces?" Ratings were distributed on a scale of one to ten, with one being the lowest score and ten being the highest score. Final results indicate a mean score of 8.9 with a standard deviation of 1.7.

Table 4. Childcare Center Director's Rating of Overall Quality of Outdoor Play Spaces at Their Centers

Rating	n	%
Excellent	2	6.2
Very Good	12	37.5
Good	11	34.4
Fair	0	0.0
Needs Improvement	4	12.5
No Response	3	9.4
Total:	32	100.0

Table 5 provides a more applicable explanation on reported vegetation value. Information in this table was gleaned through educator interviews and childcare directors' reported vegetation value (RVV) as assessed by the researcher. Value B (provides beauty) was reported most frequently (22 sites) with Value A, (provides physical comfort/shade) reported second most frequently (16 sites). Values M (shows passage of seasons), and I (provides parts for manipulative play) were second most frequently reported (9 and 4 sites, respectively). A substantive number of directors (9) indicated that nature, vegetation and trees, provides additional sources of math and science concepts. A thematic analysis of responses (Appendix C) to the question : "How do you believe vegetation can contribute and be valuable in early childhood outdoor environment?" revealed the majority of childcare providers felt that vegetation provides beauty and physical comfort as well as providing a diverse source of math and science concepts.

Table 5. Interview Response Analysis of Reported Vegetation Value (RVV)

Potential Play Value	n = 32	%
A: Provides Physical Comfort	16	50
B: Provides Beauty	22	69
C. Provides Unusual Texture	12	32
D. Provides Edible Parts	3	9
E. Provides Fragrance	9	28
F. Provides Sound	5	16
G. Provides Color	7	22
H. Provides Landmark/Focal Point	4	13
I. Provides Parts for Manipulative Play	4	13
J. Provides Structure for Climbing/Swings	4	13
K. Provides Enclosures/Refuge Space	1	3
L. Attracts Wildlife	2	6
M. Shows Passage of Seasons	9	28
N. Contributes to Regional Identity	9	28
Other: Provides source of math/science concepts	10	31
Other: Provides place to rest	9	28
Other: Provides real life experiences/responsibility	10	31

* Totals do not equal 100% because participants could check more than one response.

OBJECTIVE TWO

Create awareness to achieve change in knowledge of childcare directors to improve the outdoor learning environment by increasing the usable outdoor space, quality of outdoor activities, and increasing the time children can play outdoors by providing shade during the hottest part of the day.

In order to accomplish this objective, the researcher: 1) administered the baseline survey for childcare directors, 2) presented an educational program for childcare providers, and 3) conducted physical site assessments of thirty-two childcare facilities. Dissemination of the baseline survey for childcare directors introduced awareness of the importance of shade in outdoor learning environments. Questions fourteen and fifteen asked

childcare directors to look at what type of activities were being conducted outdoors and what stopped children from going outside to play. As may be seen in Table 6, 94 percent of time outdoors is free play with no lesson taught and 63 percent of time is spent in designed play with lesson. In response to baseline survey question number fifteen, "What keeps children from going outdoors", 88 percent of childcare providers marked rain, 81 percent marked cold, and 66 percent marked that heat limited children's outdoor time (Table 7). Data derived from physical site assessments, interviews and observations indicate that childcare directors and teachers are aware of the benefits of

Table 6. Types of Activities Conducted During Outdoor Play Time

Activity	n	%*
Designed Play Time (lesson taught)	20	63
Free Play (no lesson)	30	94
Gardening	9	28
Bird/Nature Identification	11	34
Leaf Collection	13	41
Other:	10	31

*Percentages do not sum to 100 because respondents could check more than one category.

Table 7. Factors that Stop Children from Going Outside

Factor	n	%*
Rain	28	88
Heat (> 90 Degrees F)	21	66
Cold (< 32 Degrees F)	26	81
Insects	4	13
Lack of Time	0	0
Child/lack of interest	0	0
Teacher/lack of interest	2	6
Health & Safety Concerns	2	6
Other	7	22

*Percentages do not sum to 100 because respondents could check more than one category.

shade in child play areas, but they generally lack the knowledge of how to plan and design facilities to include adequate shade.

In collaboration with the county family and consumer sciences Extension agent, the researcher conducted an educational session entitled, Green-ways and Rays: Benefits of Shade in Outdoor Play Areas. Lack of participation on this particular date may have negatively impacted the researchers ability to raise awareness of the issue at that time. In addition, as may be viewed in Table 8–Question 4, the participants did not clearly understand how to complete the evaluation or believed they had more knowledge before the training than afterward. Part two of this evaluation asked participants to rate their level of agreement with the following statements (Table 9):

a. As more children are cared for in daycare centers, I felt that childcare providers and other educators need to re-evaluate their sun protection practices and become further educated of the risks of sun exposure.

b. Since lifestyle habits begin at an early age, it is the responsibility of care givers to ensure a natural, safe environment for children to play.

c. Shade trees are an important component of the outdoor play area.

INDIVIDUAL SITE DESCRIPTIONS

The following site descriptions further explain the strengths and weaknesses identified at each site, individual potential play value ranking as well as recommendations for improvement.

Table 8. Educational Program Evaluation Results: Part I

	Knowledge Level After Training		Knowledge Level Before Training		Knowledge Gain*
	mean	**s.d.**	**mean**	**s.d.**	
Question 1.	4.44	0.53	3.67	1.00	+0.68
Your awareness of sun exposure risks and long term implications.					
Question 2.	4.33	0.71	3.89	1.36	+0.44
Your knowledge of the benefits of shade trees in the outdoor play area.					
Question 3.	3.89	1.05	3.78	1.20	+0.11
Your skills and knowledge of developing outdoor learning environments.					
Question 4.	3.11	1.05	3.22	1.09	(-0.11)
Your skills and knowledge of basic landscape design concepts.					
Question 5.	3.56	1.01	3.33	1.22	+0.23
Your knowledge of follow-up care and maintenance required for trees and shrubs.					

*Equal to mean score before training subtracted from mean score after training.

Table 9. Educational Program Evaluation Results: Part II

	mean	**s.d.**
Question a.	1.88	1.16
As more children are cared for in daycare centers, I felt that childcare providers and other educators need to re-evaluate their sun protection practices and become further educated of the risks of sun exposure.		
Question b.	2.11	1.16
Since lifestyle habits begin at an early age, it is the responsibility of care givers to ensure a natural, safe environment for children to play.		
Question c.	2.11	1.54
Shade trees are an important component of the outdoor play area.		

Sites have been ranked (1-32 with "1" being the best or highest totals, and "32" the worst or lowest scores) using an overall cumulative richness rating derived from raw data used to develop tables 10, 11, 14 and 15 (see Appendix E). All centers offer their programs to children aged six weeks through school-age. Figures 1 through 13, referenced within the site descriptions, may be viewed in Appendix G at the end of this document.

SITE 1

Site 1 is a church-run, urban preschool located near downtown Clarksville. While situated in a low-income area, highly urban area, most attendees are from middle to upper income homes. The outdoor play space consists of a large area measuring approximately 9,900 square feet. Although this center rates low in the presence of natural elements and vegetation, the outdoor play space comprises many natural features with potential for further development (Figure 1a) . This site has a cumulative richness ranking of 15 out of 32.

The play area offers a generous amount of shade afforded by five different species of large trees including Pignut Hickory, Chinese Chestnut, American Basswood, and Mulberry (Figure 1b). At the south end of the play space, a large grassed area backed by Loblolly Pines from the adjacent property offers an inviting place to create natural niches and secret hiding places. The shade trees provide characteristics of physical comfort, beauty, texture, edible parts, and sound attributing to the sensory, fine motor, gross motor and cognitive development of young children (Figure 1c). The center

ranked low in providing characteristics E, G, H & K which provides edible parts, color, landmarks or focal point, and forms enclosures or refuge places to support dramatic play.

This center is under the direction of the Department of Education and the director has chosen not to participate in the State of Tennessee voluntary Star Quality Childcare Program (rated licensing system) program. Without the worries of compliance with strict regulations, this director is more apt to integrate nature in the play area so that children may have frequent, meaningful interaction with diverse naturalistic settings. Currently, the director is writing a grant for playground improvements and has asked for assistance in the redesign process. I believe this center will be a "showcase" for other centers in the coming years.

SITE 2

Site 2 is a public childcare center located in urban, southwest Clarksville with most patrons from middle to high income residences. This Three-Star Center is positioned near the outskirts of town, this center provides service to a diverse population from both urban subdivisions to rural settings. The outdoor play space is approximately 5,300 square feet and is divided into three separate areas: toddlers - two year olds, three's - four's, and pre-K/school-age. All age groups spend 45 - 60 minutes outside, twice a day during spring, summer and fall. This site has a cumulative richness ranking of 5 out of 32.

Shade protection is provided by trees, artificial shade structures and diligent use of sun-screen. Winter months they spend slightly less time outdoors dependant upon weather conditions and go out later in the morning. Parents are asked to dress their child appropriately as they will go outside in all weather, except for the most severe weather conditions. This center rates high in the number of existing trees and in its richness value of other landscape elements. Sixteen different species were identified on this site which meet all PPVV criteria with the exception of characteristics E (provides fragrance), K (provides enclosures or refuge spaces), and L (attracts wildlife).

Many of the trees have been planted within the past two years and have great potential for providing shade in future years. The director places a high value on shade trees in outdoor play spaces, which is reflected in the variety of shade trees including red maples, lombardy poplar, and white oak. Shade trees planted along the southwest fence line will provide cooling shade to the play area as they mature (Figure 2a). A butterfly garden located at the entrance of the property provides aesthetic beauty to the center while also serving as a learning area during the day when traffic is reduced (Figure 2b) . The director pointed out that they value outdoor play as much as any other portion of the day.

SITE 3

Site 3 is located in largely urban, northeast Clarksville in a low-income area. The center participates in the Star Rating program receiving an overall score of

two with the playground receiving the lowest scores. One area, approximately 12,400 square feet are utilized by all age groups at different times throughout the day. This site has a cumulative richness ranking of 23 out of 32.

Except for a sparse patch of turf, there was absolutely no vegetation on this play area (Figure 3). The center rated low in all areas being tested. Also, natural play elements and materials identified in the survey were not seen during the physical site assessment. The play area space is small and undifferentiated with equipment that is not age appropriate for the younger children creating a safety hazard. In addition, the educator's awareness of shade tree value appeared to be very low.

At the time of the site assessment, two teachers were huddled against the building, trying to stay in a slim line of shade, as the children played on the equipment. The teachers expressed that trees could provide beneficial shade and grass would soften falls. Few, if any, opportunities for learning through nature were available outdoors. Most activities related to nature were conducted indoors through the use of books, indoor plants and animals. This director and teachers did not express enthusiasm or knowledge about plants or incorporating nature into their curriculum.

Because of the general location of this center, security of the children is an issue limiting the children's opportunities to interact with nature. Unfortunately, the childcare facility playground may be the only outdoor

activity that these young children have access to. To be developmentally appropriate, a separate play area should be built-in that offers activities for all ages, specifically the younger children. Trees planted along the south fence could provide much needed shade during the afternoon. Another option is to implement an artificial shade structure or awning to provide relief from the hot summer sun. In addition, the high number of children who utilize this one area has the ground surface beat down in areas of sparse grass and soil. The surfacing material under and around playground equipment can be a major factor in determining the injury-causing potential of a fall. For safety reasons it would be beneficial to clear the area of weeds and incorporate a more shock absorbing surface such as pea gravel on the side with the equipment.

SITE 4

Site 4 is a church-run facility located in north Clarksville which is an urban area with patrons from middle income levels. The play space measures approximately 11, 800 square feet and is divided into two separate areas, one for toddlers through two years and the other for three years through school-age. Overall this center rates high in play and learning elements as well as the density of plant species and is a Three Star Center. This site has a cumulative richness ranking of 6 out of 32.

The toddler-two year-old play space is located on the west facing side of the building which receives full sun all afternoon. The time the children are allowed to play outdoors is limited as it becomes miserable hot during the

afternoon. Two Yoshino Cherry trees have been planted eventually providing some shade and hiding places to play. I am concerned that this tree is not highly drought tolerant and may develop disease problems if not watered diligently, especially during the hottest months of the summer. The three-school age play area is quite large for the equipment that is on it (Figure 4). Most trees had been planted within the past year and were still quite small.

In the initial survey, the directors indicated a high importance value to shade trees in outdoor play areas and are enthused about incorporating nature into their curriculum. An investment of several large trees planted on the south-western side of the school-age play area would yield beneficial shade in years to come. The director expressed a need for children to experience textures, smells, the changing season and the process of watching something grow from a seed into a plant. One teacher exclaimed, "The city electric department finds it necessary to clear electric lines by cutting down our playground shade trees." Another teacher adds, "I feel that the lack of shade is often times a burden when it comes to outdoor play. Children are urged and required to attend outdoor play, but if a child finds the heat unbearable he/she will, more times than not, sit in the shade and miss out on play time. More shade, perhaps around or near the play equipment would be a big help."

SITE 5

Site 5 is located in the northern part of Montgomery County which is highly rural and low to middle income. The play space consists of one large

area utilized by all age groups throughout the day and measures 10,000 square feet. Although this is a Three Star Center, it scored low in areas measuring presence of natural elements and plant density, yet scored high in play and learning elements consisting of standard equipment. The play space consists of one large area utilized by all age groups throughout the day and measures 10,000 square feet. Although this is a Three Star Center, it scored low in areas measuring presence of natural elements and plant density, yet scored high in play and learning elements consisting of standard equipment. This site has a cumulative richness ranking of 24 out of 32.

In reference to the significance of vegetation, the director expressed a high importance value to shade trees on the playground for shade and natural beauty as well as an important learning element. She also stated that, "Nature makes it feel more homelike, rather than just having traditional play equipment available." Learning to take care of plants aids in building responsibility skills as well as visual, cognitive and small motor skill development.

The director has a strong desire to incorporate plants and nature into the curriculum, but indicated that when extra funds were available, improvements to the playground are last on the list.

SITE 6

Site 6 is a church-run, childcare facility located in north Clarksville and the area is largely urban and serves middle income families. This site has a

cumulative richness ranking of 9 out of 32. The playground consists of a large area measuring approximately 10,000 square feet which are enhanced by native species such as persimmon, white ash, hickory and tulip poplar. Twelve different species of shade trees were identified on this site and the director is somewhat plant oriented.

The current curriculum involves seasonal studies that are conducted both indoors and outdoors. Students are encouraged to use leaves and seeds that fall from trees in their arts and craft projects. These trees grace the play area providing an abundance of cooling shade over the entire area. A surprising result emerged from the teachers surveys, that nine out of 11 teachers felt that the playground was in fair condition and needed improvements, specifically, new playground equipment. I felt this outdoor play space, including the church grounds, provided many opportunities for naturalistic learning and interaction with nature. One safety concern noted was that the playground surface area consisted of soil which could benefit from a thick layer of mulch or pea gravel to provide a more shock absorbing surface material.

SITES 7 AND 8

Sites 7 and 8 are under the same management and both have similar play areas, so I am combining their description. Both sites are located in a low-income, urban neighborhood in a northeast side of Clarksville. One site provides care for infants up to pre-kindergarten age, while the other site is for

school-age children only. The majority of those registered in this program are military families representing a transient population. These site have a cumulative richness ranking of 32 and 21, respectively, out of 32.

The toddler through pre-K play area consisted of a large concrete area for riding toys, a few pieces of all-in-one play equipment, and a sparse bit of lawn grass which was in poor condition. The school-age playground had one large Silver Maple, which does provide shade and ample "helicopters" for creative play (Figure 5). The ground surface consisted of worn-down soil and meager amounts of turf-grass. Budget is a major factor in the maintenance of this childcare center. Although the director expressed an absolute interest in plants and nature as teaching tools, they feel they do not have the money to improve the outdoor play areas.

When asked how vegetation can contribute and be valuable to an outdoor play area for young children the director stated that shade trees provide a break from the sun as well as a 'homey' feeling remembered from childhood. Furthermore, the director also conveyed, they felt that flowers can add color and attract the attention of children; however, one major drawback is children with seasonal allergy problems and parents who do not want them to go outdoors.

SITE 9

Site 9 is a public childcare center located in rural southeast Montgomery County and offers its programs to low/middle income families. The play area

is quite large, 26,500 square feet, divided into two areas and equipped with permanent-all-in-one- play pieces, a play house, traditional play equipment and picnic tables. This site has a cumulative richness ranking of 30 out of 32. Shade is provided by artificial shade structure, a gazebo and the building itself. There is also a softball field nearby that is utilized by the school-age children.

The director was quite adamant about not having trees, shrubs or any type of vegetation inside the outdoor play area expressing that there were too many hazards and liabilities involved where a child might attempt to climb a tree, fall out and get hurt. The director also felt that as a rural center, many of the children had ample opportunity to play outdoors in the evenings and weekends while at home. One strength of this center is an undeveloped woody area of the property in which the director mentioned creating nature trails and planting flowers to make it more natural.

SITE 10

Site 10 is a diverse center located in southwest Clarksville which offers its programs to middle-income families from both rural and urban homes. The outdoor play area measures about 1,100 square feet divided into two areas for younger, preschool age children. This site has a cumulative richness ranking of 26 out of 32.

The school-age children spend the majority of their time in the gym or are allowed to go out on the grassy hillside to play games. Occasionally, they

will take the older children to a nearby park. The director agreed that vegetation was very important for young children and that many of them may not have access to the outdoors at home. Approximately 45 percent of children enrolled live in low-income housing where outdoor space is limited in size and safety is a factor during the evening hours when the children are home. She also stated that many children do not want to go outdoors and do not like the way grass feels on their skin. This phenomenon is referred to as biophobia, an aversion to nature. White and Stoecklin state that biophobia ranges from discomfort in natural places to active scorn for whatever is not man-made, managed or air-conditioned (1998). This fact emphasizes the importance of natural learning early in a child's life when they are developing critical life skills such as independence, separation, and learning to live in harmony with everything around them.

SITE 11

Site 11 is a public, urban childcare centered located in southwest Clarksville. Its outdoor play space measures 10,000 square feet divided into two areas that are equipped with permanent-all-in-one pieces of equipment and other permanent features. This site has a cumulative richness ranking of 12 out of 32. The ground surface consists of turf-grass that are fairly well maintained. Nine species of plants, including two large Red Maples, were identified on this site which added to the play areas richness value.

The director states that, "Having separate playgrounds for different

ages is a plus. The children love the new equipment on the pre-K playground, so we started allowing the school-age group to use the new equipment once a week. We add pea gravel, plant grass, and check for safety concerns on a regular basis." Their curriculum involves teaching seasonal activities such as fall leaf collections, nature hikes and bird watching. The play area is partially shaded by the red maples positioned on the southeast edge of the play area (Figure 6a). The center has potential to build their nature program as the teachers and directors both show enthusiasm for such activities. One problem pointed out by the director was that parents do not want the children to go outdoors especially during the winter.

The interviewed teacher seemed very enthusiastic about using the outdoors as a "living nature tool" to teach responsibility and respect of living things. One incident I would like to share occurred while we were touring the play area and the children were lining up to go indoors. The teacher was pointing out how they had used a child's plastic swimming pool as a garden, planting a tomato, zinnia's and cosmos (Figure 6b). A child started to come near and the teacher says, "Don't touch my flowers now. You know we don't touch Ms. _____'s flowers!" We only look we don't touch!

SITE 12

Site 12 is a church-run center in urban, predominantly middle income, southwest Clarksville which offers its programs to children aged six weeks through school-age. Two outdoor play spaces measuring a total of 29,600

square feet equipped with permanent all-in-one play equipment and permanent pieces. This site has a cumulative richness ranking of 13 out of 32.

This site is exceptional in that the grounds of the church offers a small lake surrounded by Weeping Willow Trees, Bald Cypress, Cattail and ornamental grasses (Figure 7a). Eleven different species of plants were identified, several of each were planted amidst the grounds. On the school-age playground itself, there were five Pin Oaks and two Red Maples which had been planted this spring and were surviving quite well for the harsh environment they must endure(Figure 7b). The children are permitted to feed the ducks and fish in the pond frequently and utilize large, shaded grassy areas for reading or other learning activities. The center voluntarily participates in the Star Quality Program is rated as a Three Star Center.

One teacher commented that, "Our center happens to be located on a beautifully kept area. We have a duck pond with lots of trees, grass, and picnic tables. We also have flowers and shrubs located all over the property that are available to us. We are a very blessed center. We also have a catwalk from one building to the other that provides shade as well as the side of one of our buildings. We have access to the whole area, not just the playground." Just as children need positive adult contact and a sense of connection to the wider human community, they also need positive contact with nature and the chance for solitude and the sense of wonder that nature offers (White & Stoecklin, 1998).

SITE 13

Site 13 is a public center located in a highly urban, predominantly low-income, area of central Clarksville. The outdoor play space measures approximately 6,669 square feet and is divided into two areas. This site has a cumulative richness ranking of 14 out of 32.

Sweet-gum, and Willow Oak provide physical comfort, beauty and also provide regenerating parts such as seed pods that are accessible to the children (Figures 8). Although the director is very enthusiastic and tries to include nature as much as possible, she felt that, "Playground renovation usually comes last when you are looking at funds." They are currently writing a grant for playground improvements and have much potential for future development. This statement substantiates the premise that childcare facility design most often does not include consideration for providing beneficial shade in outdoor play areas.

The director has a genuine love for nature and attempts to integrate such activities into the curriculum and every day outdoor play. She states, " Let children be a part of the outdoors! Pick flowers, plant seeds and watch them grow!" Plants, trees and other vegetation are important for the development of tactile, visual, and sensory skills and experience.

SITE 14

Site 14 is located in a largely rural, low to middle income area of south Montgomery County. The center possesses a large outdoor play area

measuring 15,000 square feet which are divided into two separate areas. This site has a cumulative richness ranking of 25 out of 32.

A large portion of the play area consists of lawn grass that is in medium to poor condition and encompasses permanent all-in-one equipment, equipment pieces and stored equipment. In the survey the director indicated that the value of trees in outdoor play spaces rated of high importance; however, during the physical site assessment she expressed that it was easier to place awnings or artificial shade structures that comply with the Star Quality program. When asked about incorporating nature into their curriculum, the director indicated that they do indoor science activities, teach plant life and watch the season change.

I feel that the children in this center are missing out on many opportunities for sensory learning and hands-on experiences in the outdoor environment. The center is well furnished with the latest play equipment, both indoors and out, but all that cannot replace the sensory experience that children get when their attention is captured by some natural aspect of nature such as a bee working a flower searching for nectar or the dappled sunlight through leaves of a shade tree.

SITE 15

Site 15 is located in northwest Clarksville, in a predominantly urban, middle to high income area. The outdoor play area measures 10,000 square feet and is divided into two separate play areas (Figures 9a and 9b). This site

has a cumulative richness ranking of 17 out of 32.

The ground surface is made up of a small lawn area and mulch around play equipment. The director states, "I would love to be able to set up our playground in different learning area. Right now, it is just a big, free-play area with equipment and toys for them to play with. Could use some work." The center places a high value on the importance of trees in the outdoor play space, but currently only has three small Red Maples inside the play area. The director has expressed an interest in future improvement and would like to have professional advice about design, help from volunteers trained in landscape design and more money.

SITE 16

Site 16 is a private, home childcare center located in southwest Montgomery County, in a predominantly rural environment. The play area, measuring approximately 1,000 square feet, is also the backyard of the residence. This site has a cumulative richness ranking of 11 out of 32.

Along the back fence-line, outside of the yard area, there are an existing wooded area White Oak, Tulip Poplar, Sumac and other smaller woody species. The ground surfaces consisted of lawn area which was in medium to poor condition and a large concrete area for riding toys. The director expressed a medium importance value of trees in outdoor play spaces and stated that they do not transport children, it is up to parents to take them to parks.

SITE 17

Site 17 is a home-based center located in rural Montgomery County in a predominant middle to high income area. The play area measures approximately 18, 750 square feet divided into two areas surrounded by a multitude of trees, shrubs and flowers. This site has a cumulative richness ranking of 1 out of 32.

When asked how vegetation contributes to an outdoor play area the directors expressed that nature is of great importance in learning experiences and allows children to utilize all senses. In their current curriculum they study seeds and growth, both indoors and out, take nature walks in the neighbor's woods and collect seeds, leaves or whatever else they find. Species such as Mulberry, Crape Myrtle, Crab Apple, and Hickory provide shade to the play area as well as regenerating seeds, flowers, or other parts that are accessible to the children.

Children are protected from the sun by natural existing trees, awnings, artificial shade structures, and sun umbrellas on picnic tables. The children go outside every day, except in extremely bad weather conditions. The director states, "Children thrive in natural environments where respect of all creatures is taught along with respect for the lands and all the resources it offers. We like to provide hands-on, manipulative materials, activities and a play area where the children can interact with the outside in such a manner." The director also indicated that they utilize city parks all over Clarksville, including

Dunbar Cave Natural Area for learning activities and use community centers for physical activities.

SITE 18

Site 18 is a small, home-based center located in north Clarksville, in a predominantly middle income area. The play area consists of a large area measuring approximately 7,000 square feet used by mixed age groups throughout the day. This site has a cumulative richness ranking of 7 out of 32.

The permanent equipment pieces are situated on a lawn area which was in very good condition. Tree and shrubs species that were accessible to the children consisted only of two Red Maples and one Bradford Pear. Survey results indicate that mounds or slopes, trees and stepping stones were all utilized by the children as natural elements in addition to play elements. The directors rated the importance of trees in outdoor play spaces as high importance value, although this was not represented in their actual play area. Overall, this center is overlooking many opportunities for nature-based play.

SITE 19

Site 19 is a public, urban childcare centered located in north Clarksville. Its outdoor play space measures 5,100 square feet divided into two areas that are equipped with permanent-all-in-one pieces of equipment and other permanent features. This site has a cumulative richness ranking of 28 out of 32. There is significant noise from the nearby interstate on one side and a busy street that could be blocked with an evergreen screen. Although this is

a Three Star Center, there were no trees, shrubs or lawn areas accessible to children at this facility and the educator's appreciation of vegetation value appears low and unconcerned with the outdoor environment. Its northern location makes it highly accessible to military families living in and near Fort Campbell Army Base.

When asked how vegetation was valuable, one teacher expressed an interest in taking the curriculum from indoors to the outdoor environment commenting that it was a good learning experience for a child to take care of a garden. Currently, their curriculum does include a science component and they have fish and plants which rotate from class to class. The director rated the importance of trees in outdoor play space as having medium value to children which is reflected in the low rating of frequency of species, richness and ranking of related landscape elements.

SITE 20

Site 20 is a public, urban childcare centered located in north Clarksville. Its outdoor play space measures 5,000 square feet divided into two areas that are equipped with permanent-all-in-one pieces of equipment and other permanent features. This site has a cumulative richness ranking of 29 out of 32. The infant-toddler play area was very small, but did receive shade from the building for a large portion of the day (Figure 10a). The play equipment was placed on a grassed ground surface that was eroded and well worn in several areas (Figure 10b). Otherwise, there were no trees, plants or other

vegetation on the site. The director and teacher interviewed on the site expressed a low value of vegetation and implied that their playground needs improvement. Additional trees and shrubs could contribute to the physical comfort of children by providing needed shade as well as supporting many learning opportunities.

SITE 21

Site 21 is a public, urban childcare centered located in north Clarksville. Its large, outdoor play space measures 5,000 square feet equipped with permanent-all-in-one pieces of equipment and other permanent features. This site has a cumulative richness ranking of 31 out of 32.

Unfortunately, the play area is located on an asphalt parking lot making it a virtual heat island (Figure 11). The teacher interviewed admitted that the playground was miserable and the kids did not like to play outdoors while at the center. She expressed that, "trees provide shade, let kids notice their surroundings, and changes in seasons; however, as far as their curriculum, they did little or nothing concerning nature or the environment." Children in this program have few opportunities to play outdoors outside of school because of safety factors, and video game/television keeps them indoors. The director and teacher interviewed on the site expressed a very low value of vegetation and also indicated that their playground needs improvement.

SITE 22

Site 22 is a home-based center located in a predominantly middle-income, urban neighborhood of northwest Clarksville. The outdoor play area measures 15,000 square feet encompassing many natural features including shade trees, shrubs, grapevines, fruit trees and flowers. This site has a cumulative richness ranking of 2 out of 32.

Seven different species were identified on the site and were in very good condition. The owners place a high value on the importance of shade trees and participate in outdoor activities as much as possible. They placed significant value on using nature to show children how things grow and where their food comes from. Children are protected from the sun by a multitude of large shade trees. Each day they experiment with tasting new foods, some from their gardens and some not, so the children may see, feel and touch what they eat and see where it comes from. The children grow beans and sunflowers in a garden.

The directors communicated a need for training about playing and learning outdoors, help from parents to conduct activities, help from trained volunteers and more money. Many activities could be conducted using the grapevines and additional shrubs or small trees could provide private spaces for play. The existing vegetation has many play values that may not be currently utilized such as the leaves and berries from the Mulberry trees in arts and craft projects. The owners are very enthusiastic and open to more

ideas on incorporating vegetation and planting a garden next spring.

SITE 23

Site 23 is a home-based center located in a predominantly middle-income, urban neighborhood of northwest Clarksville. The outdoor play area measures approximately 3, 360 square feet and is used by different age groups throughout the day. This site has a cumulative richness ranking of 20 out of 32.

Play and natural learning elements available for the children included a play house, benches, standard play equipment, sand and water play. Shade is provided by an artificial shade structure that allows the children to escape from the heat. Existing vegetation accessible to the children was quite sparse consisting of a lawn area, which was in good condition, and two Bradford Pear trees. The owner states that, "Recently the only big, shade-tree they had died. They have a log cabin for playing house, little-tikes cars for the children to drive, but they do not have any shade so they cannot enjoy it in the summer as I would like for them to."

The owner places a high value rating on the importance of shade trees in outdoor play spaces and would like another big tree to replace the one that died. The addition of shrubs, native trees, flowers and ornamental grasses would add to the physical comfort aspect of this center as well as providing plants that have noticeable, seasonal changes.

SITE 24

Site 24 is a home-based center located in a predominantly middle-income, urban neighborhood of northeast Clarksville. The outdoor play area measures 2,500 square feet encompassing many natural features including Silver Maple trees, shrubs, annual and perennial flower beds, and a small ornamental pond featuring both fish and plants. This site has a cumulative richness ranking of 8 out of 32.

Four different species of plants offered characteristics which contribute to both sensory and cognitive development in children. The owners place a high value on the importance of shade trees and participate in outdoor activities as much as possible. Some of the activities the children participate in include leaf and insect collections, rock painting, and planting flowers. The owner did indicate they felt that due to lack of parks in the area, children had few opportunities to play outdoors outside their program. The director states that, "Being a Three Star program, the money from grants would allow us to provide more activities, better quality of outdoor play and learning areas." Children are protected from the sun by natural, existing shade trees, awnings, and artificial shade structures. With a little encouragement, this center could develop their outdoor space into differentiated learning centers supplying many learning opportunities.

SITE 25

Site 25 is a public/partially government funded, urban childcare center located in northeast Clarksville. Its outdoor play space measures 2,400 square feet equipped with permanent-all-in-one pieces of equipment and other permanent features (Figure 12). This site has a cumulative richness ranking of 27 out of 32. Although this is a Three Star Center, there were no trees, shrubs or lawn areas accessible to children at this facility. Additionally, the educator's appreciation of vegetation value appears low and unconcerned with the outdoor environment. Its northern location makes it highly accessible to military families living in and near Fort Campbell Army Base. Currently, their curriculum does include a science component and they have fish and plants which rotate from class to class. The director rated the importance of trees in outdoor play space as having high value to children which is drastically different from what is reflected in the low rating of frequency of species, richness and ranking of related landscape elements. The director states that, "All equipment is age appropriate, wood chips cover the entire area of playground and daily inspections of the playground maintains safety of children."

Once again, many learning opportunities and benefits of natural shade are being overlooked by directors and teachers in exchange for meeting minimal requirements of licensing and regulation agencies.

SITE 26

Site 26 is a public/partially government funded, urban childcare center located in northwest Clarksville. This center is managed by the same agency as Site 25 and many characteristic are quite similar. The outdoor play space measures 4,800 square feet equipped with permanent-all-in-one pieces of equipment and other permanent features. This site has a cumulative richness ranking of 10 out of 32.

Three species identified on this site are native plants distinctive to this region in Tennessee. The director states that, "All equipment is age appropriate, wood chips cover the entire area of playground and daily inspections of the playground maintains safety of children."

Existing species include two Wild Cherries, two Red Maples, and one large Red Cedar, all of which have been poorly maintained and show storm damage (Figures 13). Additionally, the educator's appreciation of vegetation value appears low and unconcerned with the outdoor environment. Currently, their curriculum does include a science component and they have fish and plants which rotate from class to class.

The director rated the importance of trees in outdoor play space as having high value to children which is drastically different from what is reflected in the low rating of frequency of species, richness and ranking of related landscape elements. The perimeter is enclosed by six-foot fencing for safety. Improvements could be made by removing the Red Maples which

have storm damage and have been improperly pruned and replacing them with a combination of new trees and shrubs.

SITE 27

Site 27 is a home-based center located in north Clarksville, in a predominantly low to middle income area. The play area consists of a large area measuring approximately 2,500 square feet used by mixed age groups throughout the day. This site has a cumulative richness ranking of 18 out of 32. Only two plant species were identified on this site, however they were native species contributing to the regional diversity of our area.

The permanent equipment pieces are situated on a lawn area which was in mediocre condition. Tree and shrubs species that were accessible to the children consisted of one large Mulberry and several Sumac shrubs growing along the back fence line. Survey results indicate that both play and learning elements and natural elements are lacking on this site.

Although the director rated the importance of trees in outdoor play spaces as high importance value, this was not illustrated in their actual play area. I felt that, overall, this center is overlooking many opportunities for nature-based play. The center could benefit from educational sessions on topics of landscape design or use the assistance of trained volunteers to improve the play area for the children.

SITE 28

Site 28 is a public childcare center located in urban, northwest Clarksville with most patrons from middle-income residences. The outdoor play space is approximately 25,000 square feet and is divided into three separate areas: toddlers - two year olds, three's - four's, and pre-K/school-age. This site has a cumulative richness ranking of 3 out of 32.

All age groups spend 45 - 60 minutes outside, twice a day during spring, summer and fall. Shade protection is provided by large well established shade trees. During the winter months children spend slightly less time outdoors dependant upon weather conditions and go out later in the morning. This center rates high in frequency of existing trees, richness, and ranking of related landscape elements. Additionally, it ranks high in its structural diversity based on growth structure richness and frequency.

In the initial survey, the director indicated a high importance value of shade trees in outdoor play spaces. A variety of shade trees including Red maple, Tulip Poplar, Birch, Willow Oak, White Oak, White Ash, Pignut Hickory, Cottonwood and Sour Gum are planted along the fence lines as well as interspersed throughout the play areas. Play elements consist of permanent equipment pieces, stored equipment and all-in-one pieces. The director gave a high value rating to the value of trees in outdoor play spaces and this is represented by the number of trees located at the center. She also affirmed that few children have the opportunity to play outdoors outside of school

because people are busy and parents lack interest in the outdoors. The director states, "We have lots of trees, therefore if weather permits, we take the classes outside for all activities."

SITE 29

Site 29 is a public, urban childcare centered located in northwest Montgomery County. Its outdoor play space measures 5,100 square feet divided into two areas that are equipped with permanent-all-in-one pieces of equipment and other permanent features. This site has a cumulative richness ranking of 19 out of 32.

There is significant noise from the adjacent highway bypass that could be blocked with an evergreen screen. Although this is a Three Star Center, there were no trees, shrubs or lawn areas accessible to children at this facility and the educator's appreciation of vegetation value appears low and unconcerned with the outdoor environment. The only trees were located outside of the play area consisting of seven Bradford Pears and one Dogwood.

Its northern location makes it highly accessible to military families living in and near Fort Campbell Army Base. When asked how vegetation was valuable, the teacher interviewed expressed that shade definitely made it more pleasant to be outdoors providing a homelike atmosphere. Currently, their curriculum does include a science component in which they conduct seasonal activities throughout the year. The director rated the importance of trees in outdoor play space as having medium value to children which is

reflected in the low rating of frequency of species, richness and ranking of related landscape elements. At times, the teachers lack-of-interest in outdoors affect whether or not the children are able to go outdoors, specifically because it is either too hot, too cold or kids get too dirty.

I feel that with a little encouragement and education, this center would be open to new ideas of enhancing their play area with natural elements.

SITE 30

Site 30 is a home-based center located in northwest Clarksville, in a predominantly middle income area. The play area consists of an area measuring approximately 1,200 square feet used by mixed age groups throughout the day. This site has a cumulative richness ranking of 22 out of 32.

The permanent equipment pieces are situated on a lawn area which was in very good condition. The director rated the importance of trees in outdoor play spaces as medium importance value, and this is represented in their existing play area. The presence of play and learning elements such as traditional equipment, play houses and such were high in number while natural elements were practically nonexistent. The owner states that, "The equipment cost a lot and they only last for a few years, and then have to be replaced." The director conveyed a rather low value of vegetation but also felt that their playground did not need any improvement. Overall the center rates low in frequency, richness and ranking of related landscape elements as well

as in play and learning elements present. Additional trees and shrubs could contribute to the physical comfort of children by providing needed shade as well as supporting many learning opportunities.

SITE 31

Site 31 is a home-based center located in a low-income, rural neighborhood northeast of Clarksville in Guthrie, Kentucky. The outdoor play area encompasses 15,000 square feet of natural features including large shade trees, shrubs, and flowers. This site has a cumulative richness ranking of 4 out of 32.

A high value is placed on the importance of shade trees and children participate in outdoor activities as much as possible. Sun protection is provided by large Silver Maple, Sycamore, and Mulberry trees which also provide limbs that can support both climbing and swinging. Shrubs such as Burning Bush Euonymous provide nice refuge spaces for the children. The owner states, "We learn as we see things. We play with leaves, using them for art projects and learning. Nature is not thought of as the background, it is integrated into our everyday activities as we take walks or just sit under the trees. I am pleased with the shade and space, but we have a lot of mosquitos and no ground-cover under the climbers and swings. The yard gets muddy after rain and we have to stay on our sidewalks and patio."

Mulch or living ground cover such as shade tolerant creeping fescue grass, ajuga or low-growing herbs could be planted under play equipment to

prevent water standing. For the mosquitos, Lemon Thyme, Lemon Balm and Mosquito Plant are all reported to have repellent properties; however, they cannot repel the mosquito's by just sitting there! The leaves must be crushed and spread on the skin, but this sound's better to me that synthetic chemical sprays. I also recommend using mosquito dunks in areas of standing water and/or eliminating the standing water to reduce numbers of mosquito larvae. Worse scenario, spray area with chemicals when the children are not present.

SITE 32

Site 32 is a public, rural childcare centered located southwest of Clarksville in Pleasant View. Its outdoor play space measures 15,000 square feet divided into two areas that are equipped with permanent-all-in-one pieces of equipment and other permanent features. This site has a cumulative richness ranking of 16 out of 32.

The ground surfaces consist of turf-grass areas that are fairly well maintained. Their curriculum involves teaching seasonal activities such as fall leaf collections, nature hikes and bird watching. The play area is partially shaded by two red maples located on the southeast edge of the play area. The teacher interviewed appeared very enthusiastic about using nature as an important sensory experience. Protection from the sun is provided by an abundance of large White Oak and Red Maples trees which also bring forth observable seasonal changes and are distinctive of this region of Tennessee.

OBJECTIVE THREE

Determine the need to plant shade trees and other vegetation that will grow and provide shade as well as a rich learning environment in outdoor play areas for future generations.

To accomplish this objective the researcher: 1) utilized the baseline survey to identify both natural and built elements currently existing in outdoor play spaces, 2) utilized the data collection sheet to identify plant species & growth structure of existing vegetation at each site, 3) developed a plant species list, and 4) utilized the Potential Play Value of Vegetation Index to identify the presence of nineteen potential play value characteristics.

To determine the need to plant shade trees or provide additional natural and built elements, the researcher first sought to identify the existence or absence of those elements by analyzing questions included in the baseline survey for childcare directors. Comparison of Question 10, "Which of the play and learning elements are present in your outdoor spaces," and Question 11 (Tables 10 and 11), "Which of the following natural elements are present in your outdoor play spaces," reveals that while all thirty-two daycare centers have traditional play equipment, only 47 percent have trees. Furthermore, water-play (69%), sand (63%), and play-houses (59%) are all reported more frequently in play areas than perennial plants (22%), natural mounds (22%), and fruit trees (19%). Children in daycare situations are spending more time in structured programs emphasizing academic programs, which means that

Table 10. Play and Learning Elements Present at Thirty-two Childcare Centers

Element	n = 32	%
Art/Crafts Area	11	34
Balance Beams	13	41
Play House	19	59
Music Area	3	9
Benches	15	47
Traditional Play Equipment	32	100
Picnic Tables	18	56
Sand Area	20	63
Water Play Area	22	69
Woodwork	3	9
Porch-type Swing	3	9
Standard Swing	14	44
Other	6	19

*Percentages do not sum to 100 because respondents could check more than one category.

Table 11. Natural Elements Present at Thirty-two Childcare Centers

Element	n = 32	%
Ground Surfaces (dirt, pea gravel, mulch)	31	97
Perennial Plants	7	22
Mounds	7	22
Trees	15	47
Shrubs	9	28
Fruit Trees	6	19
Garden	10	31
Stepping Stones	2	6
Logs	3	9
Pets	5	15
Smooth Rocks	3	9
Vines	3	9
Other	3	9

*Percentages do not sum to 100 because respondents could check more than one category.

children have less time to interact with nature. The need to plant shade trees means trees are needed to provide protection from the sun as well as to provide a complex environment that will engage the learning interests of diverse groups of children.

According to question number twelve on the director's survey, "How are children protected from the sun", 56 percent of respondents indicated trees were utilized as a sun protection practice, while 47 percent implied they used an artificial shade structure for sun protection (Table 12). Planting shade trees can provide additional protection from the sun's rays. The sun's rays are highly intense during the summer months and can damage children's sensitive skin.

Using the data collection sheets, the researcher identified vegetation at all sites and compiled that information into a plant species list. A list of plant species (Table 13) discloses the common name, scientific name, density among sites and number of sites with species present. Sixty-three plant

Table 12. Sun Protection Practices Utilized in Childcare Center Outdoor Play Spaces

Elements Utilized	n	%*
Trees	18	56
Arbor	0	0
Gazebo	3	9.4
Awning	6	19
Artificial Shade Structure	15	47
Other	5	16
None	3	9

*Percentages do not sum to 100 because respondents could check more than one category.

Table 13. Plant Species List

Plant Key: S= Shrub, FT= Fruit Tree, T= Tree, GC= Groundcover, OG= Ornamental Grass, A/P= Annual/Perennial Flower, V=Vine

Common Name	Scientific Name	Total Density	Number of Sites w/Species Present
Abelia, Glossy (S)	*Abelia x grandiflora*	3	1
Ajuga, Bugleweed (GC)	*Ajuga reptans*	20	1
Annual Flowers (A/P)	*Various species (spp.)*	11	6
Apple Tree (FT)	*Prunus spp.*	6	2
Arborvitae (S)	*Thuga oxidentalis*	2	2
* Ash, White (T)	*Fraxinus americana*	13	3
* Basswood (T)	*Tilia americana*	1	1
Boxwood, Common (S)	*Buxus sempervirens*	20	1
Bradford Pear (T)	*Pyrus calleryana*	32	8
Burning Bush (T)	*Euonymous alatus*	16	1
Butterfly Bush (S)	*Buddleia davidii*	2	1
Cattail (OG)	*Typha spp.*	3	1
Cherry, Yoshino (T)	*Prunus x yedoensis*	4	2
* Cherry, Wild (T)	*Prunus pennsylvanica*	2	1
Chinese Chestnut (T)	*Castanae glabra*	1	1
Cotoneaster (S/GC)	*Cotoneaster adpressus*	1	1
* Crab Apple (FT)	*Malus spp.*	3	2
Crape Myrtle (S)	*Lagerstremia inidca*	10	3
Cypress (T)	*Cupressocyparis spp.*	5	1
Daylily, Stella d' Oro (GC)	*Hemeracallis spp.*	10	1
* Dogwood (T)	*Cornus florida*	7	4
Elephant Ears (A/P)	*Platycerium elephantosis*	6	1
Euonymous, Japanese (S)	*Euonymous japonica*	1	1

Table continued; ***native species**

Table 13. Continued

Common Name	Scientific Name	Total Density	Number of Sites w/Species Present
Grapevine (V)	*Vitis vinerfera*	5	1
* Hackberry (T)	*Celtis occidentalis*	11	5
* Hickory, Pignut (T)	*Carya glabra*	7	4
Holly, American (T)	*Ilex opaca*	1	1
Holly, Foster (T)	*Ilex x attenuata* "Fosteri'	4	1
Hosta (T)	*Hosta spp.*	5	1
Juniper, Blue Star (S)	*Juniperus squatmata* 'Blue Star'	1	1
* Juniper, Columnar (T)	*Juniperus virginiana* 'Burkii"	2	1
Juniper, Creeping (S)	*Juniperus horizontalis*	2	1
* Juniper, Red Cedar (T)	*Juniperus virginia*	1	1
Liriope Grass (GC)	*Liriope spp.*	48	3
* Maidengrass (OG)	*Miscanthus spp.*	3	1
Mimosa (T)	*Albizia julibrissin*	1	1
Maple, Japanese (T)	*Acer palmatum*	2	1
* Maple, Red (T)	*Acer rubrum*	33	12
* Maple, Silver (T)	*Acer saccharium*	10	4
Nandina (S)	*Nandina domestica* 'Compacta'	2	1
Nandina, (S)	*Nandina domestica spp.*	2	1
* Oak, White (T)	*Quercus alba*	20	3
* Oak, Pin (T)	*Quercus palustris*	3	1
Peach Tree (T)	*Prunus persica*	2	1
Perennial Flowers (A/P)	Various spp.	13	4
* Persimmon (T)	*Diospyros virginiana*	1	1
Photinia (S)	*Photinia x fraser*	1	1
* Pine, Loblolly (T)	*Pinus taeda*	1	1
* Pine, E. White (T)	*Pinus strobus*	5	2
* Poplar, E. Cottonwood (T)	*Populus deltoides*	2	2

Table continued; ***native species**

Table 13. Continued

Common Name	Scientific Name	Total Density	Number of Sites w/Species Present
* Poplar, Lombardy (T)	*Populus nigra*	2	2
* Poplar, Tulip (T)	*Liriodendron tulipifera*	12	3
* Redbud, Eastern (T)	*Cercis canandensis*	6	2
* Riverbirch (T)	*Betual nigra*	5	2
Rose (S)	*Rosaceaea spp.*	1	1
Sour Gum (T)	*Nyssa sylvatica*	1	1
Spirea (S)	*Spirea japonica* 'Little Princess'	6	1
* Sumac, Smooth (T)	*Rhus glabra*	10	2
* Sweetgum (T)	*Liquidambar styraciflua*	16	3
* Sycamore (T)	*Platanus occidentalis*	2	2
* Willow, Weeping (T)	*Salix alba*	4	1
Yew, Japanese (S)	*Taxus cuspidata*	1	1

***native species**

species were identified across all thirty-two sites. Of these, 35% were native species. Red Maple, *Acer rubrum*, was the most frequently reported native, shade tree with a total of 33 distributed among 12 sites. Following in frequency are: White Oak, *Quercus alba,* (20); Sweetgum, *Liquidambar styraraciflua,* (16); White Ash, *Fraxinus americana*, (13); and Tulip Poplar, *Liriodendron tulipifera.* The most common non-native species was the Bradford Pear, *Pyrus calleryana*, with a total of 32 distributed among 8 sites.

The potential play value of vegetation was evaluated according to the presence of matching characteristics found in identified plants. Presence of nineteen potential play value characteristics were determined for each site and the percentage of centers with plants exhibiting those characteristics is outlined in Table 14. Results regarding potential play value of vegetation among all sites indicated relatively high frequency (21/32) of values A, B, C, and R. Values F, I, M, O, P, and Q were also reported frequently (20/32).

Diversity based on growth structure indicated that the majority of plants among the 32 sites were large trees, 53%, and medium trees, 38% (Table 15). Groundcover plants appeared at 4 sites and vines at 2 sites. All sizes of shrubs and small trees appeared rarely, which is unfortunate since shrubs are of a child's scale and their characteristics are accessible to children. The need to plant shade trees is indicated in the lack of trees and other vegetation among the sites. Directors reported the value of vegetation as providing physical comfort, beauty, environmental responsibility; yet, the actual

Table 14. Potential Play Value of Vegetation (PPVV) Summary: An assessment of existing vegetation as related to nineteen potential play value characteristics for woody plant species as reported by director's at thirty-two childcare facility outdoor play spaces.

PPV Characteristic:	n=32 (number of centers indicating presence of value)	%
A: Provides Physical Comfort	21	66
B: Provides Beauty	21	66
C. Provides Unusual Texture	19	59
D. Provides Edible Parts	12	38
E. Provides Fragrance	17	53
F. Provides Sound	19	59
G. Provides Color	19	59
H. Provides Landmark/Focal Point	19	59
I. Provides Parts for Manipulative Play	16	50
J. Provides Structure for Safe Climbing/Swing Attachment	16	50
K. Forms Enclosure/Refuge Area	19	59
L. Attracts Wildlife	21	66
M. Shows Passage of Seasons	20	63
N. Contributes to Regional/Cultural Identity	20	63
O. Is Safe for Young Children	20	63
P. Does not Create Significant Maintenance Requirements	20	63
Q. Is Accessible to Children	22	69
R. Is Well-Maintained	21	66
S. Is Intentionally Planted or Placed	21	66

Table 15. Growth Structure, Frequency (# species/site), and Structural Diversity Based on Plant Growth Structure

Growth Structure	n = 32	%
Large Trees (> 70' tall at maturity)	17	53
Medium Trees (30 - 50 ' tall at maturity)	12	38
Small Trees (< 30' tall at maturity)	6	19
Large Shrubs	7	22
Medium Shrubs	4	13
Small Shrubs	1	3
Vines	2	6
Ground Cover	4	13

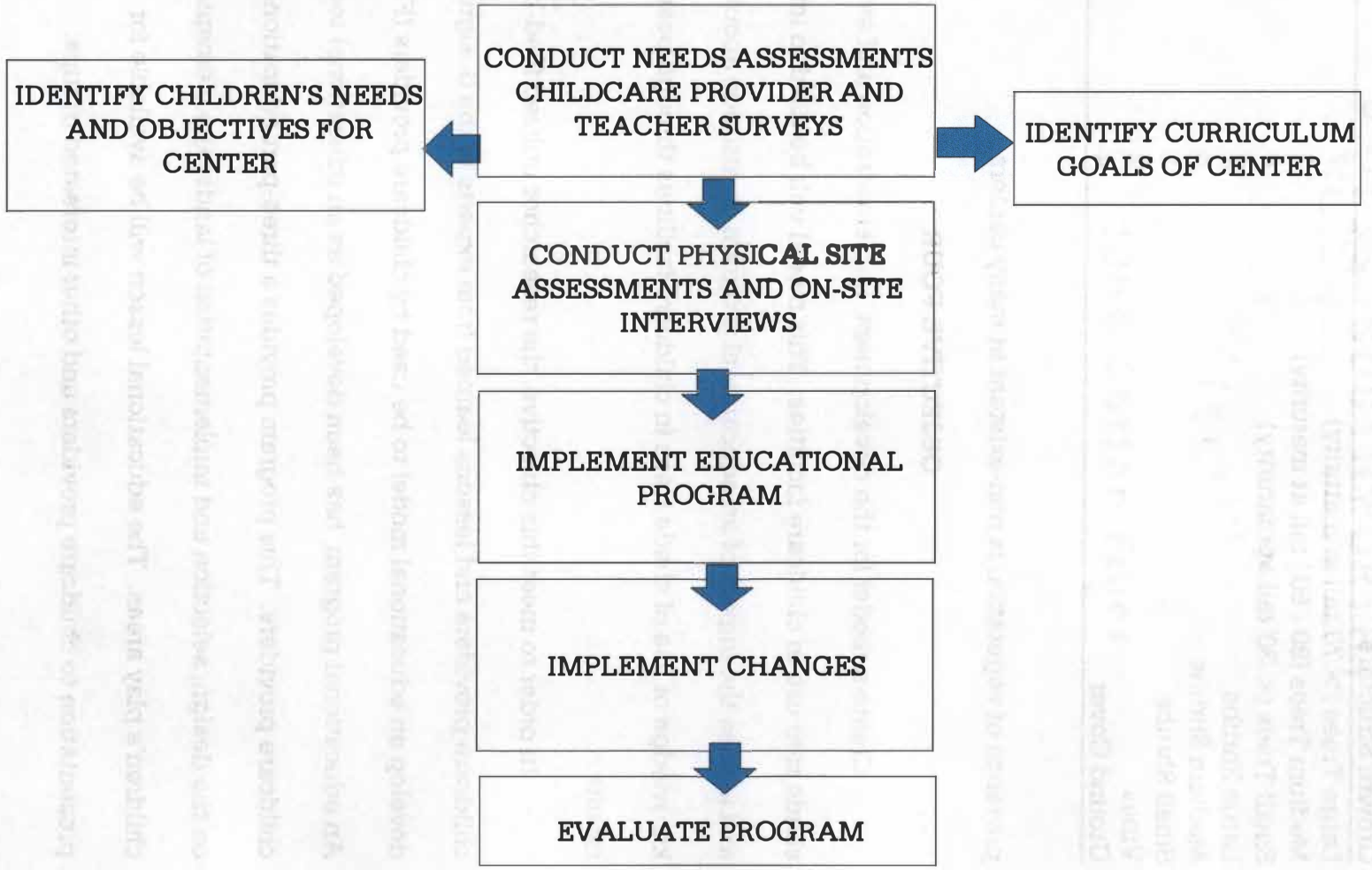
presence of vegetation is non-existent at many centers.

OBJECTIVE FOUR

Create a model for the development, implementation and evaluation of shade tree use in childcare facilities. This model will be used to implement and assess the impact of an educational program on attitude about and knowledge of use of shade trees in childcare facilities through post-test results.

In order to meet this objective, the researcher utilized feed-back from childcare providers and lessons learned from experts in the design field to develop an educational model to be used by childcare providers (Figure 14). An educational program has been developed as an educational tool for childcare providers. This program provides a three-part educational program on the design, selection and implementation of landscape elements for children's play areas. The educational lesson will be available for presentation to childcare providers and other interested groups.

FIGURE 14: MODEL FOR THE DEVELOPMENT, IMPLEMENTATION AND EVALUATION OF SHADE TREE USE IN CHILDCARE FACILITIES



CHAPTER V: DISCUSSION AND RECOMMENDATIONS

CHANGING THE PARADIGM

This research study contributes to the fast emerging field of childhood studies that look at the importance of trees, nature, and their effects on children's play and learning. While the current model envisioned by childcare providers is a playground full of traditional equipment, many existing natural features could be enhanced at little expense. Study results indicate that childcare providers consistently felt that providing shade was highly important, however, the outdoor play environments do not reflect that attitude. Data derived from site assessments, interviews and observation indicate that childcare directors are aware of the benefits of shade, but they lack the knowledge of how to plan and design facilities to include adequate shade. Discrepancies occurred time and again in what was reported on the *Baseline Survey for Childcare Directors* and what was actually seen during the physical site assessments.

Attitudes are difficult to measure in quantitative terms considering attitudes develop over time and often originate from the environment in which one was raised, such as urban locales compared to rural vicinities. Childcare directors and educators who adore nature and enjoy being outdoors are more likely to have centers that reflect that attitude through outdoor play space design and curriculum choices. Outdoor play is a critical component of early childhood development and should be an extension of the indoor curriculum,

not separate from it. Although many centers reported planting seeds as a portion of their science curriculum, after germination, the plants were either sent home or thrown out after a time. The data gathered indicated that many opportunities for interaction in nature are not being explored and utilized.

One issue that influences the attitudes of childcare providers is the fear of regulation. Over the past fifteen years there have been many changes and new regulations that providers are afraid of going beyond mandates because making mistakes which could affect their quality ratings and state funding. When asked about tree planting, various reactions occurred among childcare directors and these statements were made:"the children would want to climb the trees and they can fall and get hurt", and "they will trip over the above ground roots". Yes, this is true! But, they can just as easily fall off the jungle gym or be kicked in the face by someone on a swing!

Consequently, if the outdoor play area has sufficient ground surface material the child is less likely to be hurt from any type of fall. Specific guidelines for playground safety are available through agencies such as The National Program for Playground Safety, and acts such as The Americans with Disabilities Act. A concept which is difficult to understand is how some centers were meeting all the requirements by law, even going beyond mandates; then, on the other end of the spectrum, there were centers with appalling conditions such as inadequate equipment, improper surfacing materials and small play areas used by several age groups throughout the

day.

Despite extensive knowledge of what is needed to provide quality care in early childhood, many programs fail to do so. Multiple regulatory systems may not apply to individual programs, sometimes with overlapping or even contradictory requirements. While licensing systems seek to reduce possible harmful environments in childcare centers, regulatory systems in many states are not adequately supported and therefore unable to completely protect children's healthy development and learning.

The National Association for the Education of Young Children, in collaboration with the National Health and Safety Performance Standards (1997), have identified five issues exemplifying the lack of support:

1. Some states set their basic floor of protection too low, failing to reflect research findings about the factors that create risk or harm;
2. A large number of settings in some states are exempt from regulation;
3. The licensing office in some states is not empowered to adequately enforce the rules;
4. Multiple regulatory systems may apply to individual programs, sometimes with resulting overlapping or even contradictory requirements; and
5. Policymakers may view licensing as unnecessary because they

believe it seeks the ideal or imposes an elitist definition of quality rather than establishing a baseline of protection.

This lack of support among the regulatory system is an important issue for childcare providers. As we have seen in this study, many centers are meeting the regulatory requirements and having trees on their playgrounds; then, some are barely within passing guidelines and afraid to go beyond the mandates. This shows that it can be done. A center can be rated a "Three-Star-Center" and still have trees, grass and other natural elements in the play areas. A system needs to be developed outlining specific landscape design requirements for childcare centers which meet the guidelines of state and federal regulating agencies. Developing this type of procedure will entail further research and communication between educators and other agencies involved in early childhood development as well as provision of educational opportunities for childcare providers.

When reviewing the overall ranking of sites, those which serve middle to upper class children generally had more vegetation on the outdoor play areas than those in low-income areas. Centers located in highly urban, low-income neighborhoods lacked not only vegetation and other natural elements, but also were deficient in appropriate play equipment and ground surfaces. Many highly urban centers were likely to be located near low-income housing areas that have more concrete, asphalt and low-standard playground equipment. This fact is disturbing because the childcare facility playgrounds may provide the only opportunity for those children to play outdoors in a safe

environment. Moreover, 28 percent of directors stated that children have few opportunities to play outdoors outside of school. The reasons for this include busy parents, lack of parks, and the availability of video games and television for entertainment. When children are not appropriately engaged, aggressive behavior increases (Torelli & Durrett, 1996). Widespread opinion among childcare center directors was that the outdoor facility play space was more of an afterthought than a critical part of the initial design process.

The bottom line is that regardless of income status or location, childcare play spaces should be designed to enhance children's awareness of environment, actively support every aspect of their development, and provide interactive elements combining both natural and built elements. According to the types of activities being conducted in outdoor play areas, thirty out of thirty-two centers reported they had free play with no lesson taught during outdoor time. Typically, children go outside to play approximately three times a day for 30-45 minutes at a time. This time is limited to 15 minutes during hot summer months and cold winter months. Trees planted in the correct locations can provide cooling shade in the summer while allowing the sun to warm areas in the winter; thus, increasing the usable time outdoors. While the word 'play' has it connotations of aimlessness or entertainment that often conflicts with educational goals (DeVries et al., 2002), play is the investigative process by which young children construct knowledge and is central to the concept of developmentally appropriate practice advocated by the National Association for the Education of Young Children (NAEYC) (Bredekamp &

Copple, 1997).

Traditional play equipment does have a role in children's play spaces; however, much of the equipment being used is not age appropriate for all the children using it, which can create an unsafe play environment. Many traditional playgrounds are placed in the full sun exposing children to dangerous rays and reducing the usable time spent outdoors. The new kinds of outdoor play, while they do not require more money, do require more involvement from the people who will play in and care for the discovery play garden (Stoecklin, 2000). When creating a landscape design, outdoor play areas could be divided into zones using plants, water features and theme gardens rather than having a large open spaces with a grouping of traditional play equipment. Guddemi & Erikson (1992) suggest five zones of activities: nature, adventure play, active play, quiet learning, and quiet play.

A major finding of this study is that childcare directors and teachers are aware of the benefits of shade in child play areas, but they generally lack the knowledge of how to plan and design facilities to include adequate shade. In addition, there is a lack of knowledge on how to select, implement, and care for shade trees. This lack of knowledge is not unexpected, or meant to be reflected negatively, considering that childcare providers are schooled in fields of early childhood education or family consumer sciences rather than horticulture or plant science. It is important for children to be involved in nature, but it is not going to happen unless teachers and other staff are willing

to get involved. Educational programs are needed to enable childcare providers to make knowledgeable choices and spend available monies on landscape materials as well as traditional equipment pieces. Understanding basic landscape design concepts and how the children use the environment will enable childcare providers to increase the usable outdoor space of their center. A well-designed environment can have a huge impact on the well-being of both the children and teachers. Unfortunately, the typical design process does not take into account curriculum goals, teacher-student needs, learning objectives of the center. The concept of participatory design process allows all entities to work together in developing a high quality center. For this concept to be successful, the owner, architect, landscape architect, landscape designer, teachers, parents and children must communicate their goals and expected outcome.

CONCLUSION

Raising awareness of the importance of shade is not only imperative to childcare providers, but to others involved in the early childhood education field. It is important that educators and parents act as advocate's for children's rights to nature. While this study began with the intention of measuring attitude and raising awareness about the importance of shade trees in outdoor play spaces, the results have opened the door to a much larger learning opportunity. It is a door that has been closed for too many years. Attitudes develop over time, and the knowledge-attitude-behavior

change model holds that an increase in knowledge will in turn lead to a change in attitude which will in turn influence behavior (Matthews & Riley, 1995).

In developing accreditation guidelines, the value and role of shade trees in the play environments need to be explained and required in daycare facilities. Planting shade trees should be required because of all the benefits, but because it is not required and childcare directors are not educated in horticulture, most facilities do not have many trees. In providing education for early childhood educators, perhaps a more collaborative approach with other professional fields is needed, especially the regulatory agencies who set the guidelines. With proper guidelines, education and the model provided in this study, childcare providers can enhance the quality of their outdoor play spaces and stay within state guidelines for providing a safe environment for children.

Designing for all children requires a multi-disciplinary, cross-functional team from the beginning (Stoecklin, 1999) and, to design for aesthetic richness, the building's or room's elements (floors, walls, ceilings, etc.) all should be conceived of as interactive surfaces (Olds, 1989). This study shows a clear need for modifications in licensing and regulation, director education on value and use of shade trees on play grounds, and materials to aid in tree selection, installation and care.

Mud pies anyone?
Down in a little back garden,
Under a sunny sky,
We made mud pies together–
My little sweetheart and I.
Stained was the little pink apron,
Muddy the jacket blue,
As we stirred and mixed and tasted,
Out in the sun and dew.
Why do I dream of that garden,
I who am old and wise?
Why am I longing, longing
For one of those old mud pies?
Oh, for the little pink apron,
Oh, for the jacket blue,
For the blessed faith of childhood
When make-believers are true.
(Longing for the Old Mud Pies, Florence A. Jones)

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APPENDIXES

APPENDIX A

BASELINE SURVEY FOR CHILDCARE CENTER DIRECTORS

BASELINE SURVEY FOR CHILDCARE DIRECTORS

1. Contact Information:

Name of Center:	Address of Center:
Your Name:	
Your Position:	
Email:	Telephone: ( ) -
	FAX: ( ) -
Number of Employees:	(A teachers survey will follow)

2. What is your highest level of education?

High School Grad./G.E.D.	
Associates Degree	Field of Study:
Bachelors Degree	Field of Study:
Masters Degree	Field of Study:
Doctorate	Field of Study:

3. Please provide the following information: ages of children enrolled in your center; number of children enrolled, and number of teachers assigned to each age group.

Ages of children	Number of children enrolled	Number of teachers/group
Ex. Infants	15	3

4. Do any of the children have special needs?:

Age Group	Number of children	Type of disability

5. Is your center: ☐ Urban ☐ Rural

6. Is your center located in a: (check one)

- ☐ High income area
- ☐ Low income area
- ☐ Middle income area

7. Does your center voluntarily participate in the Star Quality State Rating System?

☐ Yes ☐ NO ☐ No knowledge of program

If yes, what is your current rating? 1 2 3

8. How would you rate the overall quality of the outdoor play space of your center? (Check one)

☐ NEEDS IMPROVEMENT ☐ FAIR ☐GOOD ☐ VERY GOOD ☐ EXCELLENT

9. Please list ALL the outdoor play spaces of your center with approximate dimensions.

Outdoor play space (age group that uses that area)	Approximate Length X Width (in feet)
Ex. "Two year olds"	20 X 30 feet

10. Which of the following PLAY & LEARNING ELEMENTS are present in your outdoor spaces? Please check as many elements as appropriate.

☐ Arts and Crafts Area
☐ Balance Beams
☐ Music Play Area
☐ Benches
☐ Play Equipment
☐ Picnic Tables
☐ Sand Play
☐ Water Play
☐ Woodwork Bench
☐ Porch-type Swing
☐ Swings
☐ Other: please specify

11. Which of the following NATURAL ELEMENTS are present in your outdoor play spaces? Please check as many as are appropriate.

☐ Ground Surface (mulch, pea gravel, grass)
☐ Perennial Plants
☐ Mounds or slopes (used by children)
☐ Trees
☐ Shrubs
☐ Fruit Trees
☐ Flower/Vegetable Garden
☐ Stepping Stones
☐ Logs
☐ Pets
☐ Smooth Rocks

12. How are the children protected from the SUN? Please check all that are appropriate.

☐ Trees
☐ Shrubs
☐ Gazebo
☐ Awning
☐ Artificial Shade Structure
☐ Other, please list

13. How many TIMES PER DAY do children utilize the outdoor play area in each season and HOW LONG each time (duration)?

Age	Summer		Fall/Spring		Winter	
	#time/day	duration	#times/day	duration	# times/day	duration
Ex. "two's"	*2 times/day*	*30 minutes*	*2times/day*	*60 min.*	*once/day*	*15-30 min.*

14. What types of activities are conducted during outdoor time? Check all that apply.

☐ Designed play-time (lesson taught)
☐ Free play (no lesson)
☐ Planting/tending garden
☐ Bird/Nature Identification
☐ Leaf Collection
☐ Other, please specify:

15. What STOPS your children form going outside? Check all that apply.

☐ Rain
☐ Heat (> 90 Degrees F)
☐ Cold (< 32 Degrees F)
☐ Insects
☐ Lack of time
☐ Children not interested in outdoors
☐ Teacher lack of interest in outdoors
☐ Health & Safety Concerns
☐ Other, please list:

16. In your opinion, rate the importance of trees in outdoor play spaces.
(1 = low importance, 10 = high importance)

<--->
1 2 3 4 5 6 7 8 9 10

17. As a director, what would it take for you to make the best use of your outdoor play and learning area? Check all that apply.

☐ Training about playing and learning outdoors
☐ Professional advice about design
☐ Help from parents to conduct activities
☐ Help from volunteers trained in landscape design
☐ More staff
☐ More money
☐ Other, please list:

18. Do the children attending your center use any other outdoor areas such as a nearby park, on a regular basis? ☐ YES ☐ NO

If yes, please describe:

---

19. Please include any other COMMENTS below regarding the quality of your outdoor play and learning areas. Use back of page if necessary.

APPENDIX B

FOCUS GROUP QUESTIONS

FOCUS GROUP DISCUSSION QUESTIONS

- What are your initial thoughts about providing shade in outdoor learning environments?
  - *probe for positive/negative thoughts*
- Would you consider planting trees to provide shade for children?
  - *probe for specific incidences, actual experiences, childhood memories etc.*
- Do you feel there is a lack of awareness among childcare providers on the benefits of shade in outdoor play spaces? What other training have you had related to playground design?
  - *Why or why not? Specific training?*
- Could this lack of awareness be related to the fact that most childcare providers are schooled in early childhood education rather than plant science or horticulture?
- Do you feel that childcare providers could benefit from a program offering educational sessions on facility design considerations, especially playground development?
  - *Why or why not? What type of training?*
- Do you feel that childcare providers could benefit from a program that offered a plan to educate childcare directors and other employees on how to select, plant and care for shade trees?
  - *Why or why not? What type of training?*
- Estimate the amount of time children in your care spend outdoors.
- Is sun protection provided? How is sun protection provided?
- Do you feel that there is such a thing as a "child's space" or "children's landscape."
  - *How do adult ideas differ from a child's when you consider playground design?*
- If you were designing a playground, what would it look like?
  - *Traditional asphalt, concrete, standard play equipment ?*
  - *Natural areas, trees, grass, flowers, mud?*
- If a child designed a playground, what would it look like?

APPENDIX C

THEMATIC ANALYSIS OF DATA COLLECTION SHEET

THEMATIC ANALYSIS OF DATA COLLECTION SHEET QUESTIONS 1 - 3

1. **How do you believe vegetation can contribute and be valuable to an outdoor play area for young children?**

Health Factors: provide shade, clean air, grass softens falls
Natural Learning Environment: opportunities to learn new textures; to interact visually and cognitively in a home-like atmosphere; opportunities for sensory development
Environmental Responsibility: children can see that hard work pays off as they watch seedlings grow into plants; children may not have these types of opportunities at home.
Drawbacks: allergies; too many hazards; teacher hands-off-attitude, "children may pick my flowers", look but don't touch.

2. **What do you do in your curriculum to teach children about plants, nature and the environment?**

Plant gardens within view of inside windows
Science Centers: plant seeds that grow throughout the different seasons (i.e. seeds in spring, trees in fall); live plants & fish inside classrooms; use curriculum indoors
Environmental Stewardship: nature walks, leaf collections

3. **How many opportunities do you believe the children in your program have to play outdoors outside of school ?**
(Many, Few, Some, Diverse Mix)

Many: 13/32, 41%
Some: 7/32, 22%
Few: 9/32, 28%
Diverse Mix: 8/32, 25%

Other comments:
Many children in center go to area parks and pools.
Children do not want to stay outside because it is too hot.
No funds; playground is put last.
Few; most children at this center are from low-income areas and do not like the feel of grass.
Playground renovation is usually last on the list when looking at funds.
[Children] play video games which keeps them indoors. Our playground is on a parking lot.
Lack of parks in the area [North Clarksville] keeps children from playing outdoors as much.
Busy parents don't have time to go to park, etc.
We learn as we see things, so it is important to use pine cones, leaves etc. for art projects. Take walks and include lots of interaction with nature.

APPENDIX D

POISONOUS PLANTS LIST

COMMON LANDSCAPE PLANTS AND THEIR TOXIC PARTS

Hyacinth, Narcissus, Daffodil:	Bulbs, when ingested can cause nausea, vomiting, diarrhea; can be fatal.
Oleander:	Leaves, branches; extremely poisonous.
Diffenbachia (Dumb Cane):	All parts cause intense mouth irritation; can be fatal if tongue swells enough to block airway.
Rosary Pea, Castor Bean:	Seeds; a single rosary pea has caused death; one or two castor bean seeds are near lethal dose for adults.
Larkspur:	Young plants, seeds; stomach irritant.
Lantana:	Berries; ingestion of berries can be fatal to a young child.
Foxglove:	Leaves; usually cause stomach upset, mental confusion.
Bleeding Heart:	Foliage, roots; must be ingested in large amounts to be fatal.
Wisteria:	Seeds, pods; may cause mild to severe stomach upset.
Laurels, Rhododendron, Azalea:	All parts; fatal; produce symptoms such as nausea, vomiting, depression, difficult breathing, and coma.
Yew:	Berries, foliage; can be fatal; foliage more toxic than berries.
Wild & cultivated cherry:	Twigs & foliage; fatal; contain a compound that releases cyanide when eaten.
Mayapple:	Apple, foliage, roots; contains many toxic principles
Mistletoe:	Berries; fatal
Pokeberry:	Berries; common weed; produce purplish-black berries that resemble grapes

* This list is not comprehensive. It is meant to serve as a guideline for identifying poisonous plants used in landscape settings that may be harmful to children. Contact your local Agriculture Extension office or USDA for more comprehensive information for you particular area.

APPENDIX E

CUMULATIVE ANALYSIS OF TABLES 10,11, 14 & 15

Cumulative Ranking Based on Richness Values (Raw data analysis of Tables 10, 11, 14, & 15)

Site #	Table 10 (n=13) (Play/Learning Elements)	Table 11(n=13) (Natural Elements)	Table 14 (n=19) (PPVV Index)	Table 15 (n=8) (Structural Diversity)	Total	Rank
1	0.23	0.23	0.95	0.25	1.66	15
2	0.46	0.23	1.00	0.75	2.44	5
3	0.62	0.08	0.00	0.00	0.70	23
4	0.69	0.38	0.68	0.63	2.38	6
5	0.62	0.08	0.00	0.00	0.70	24
6	0.46	0.23	0.95	0.50	2.14	9
7	0.08	0.08	0.00	0.00	0.16	32
8	0.08	0.08	0.68	0.13	0.97	21
9	0.23	0.08	0.00	0.00	0.31	30
10	0.46	0.15	0.00	0.00	0.61	26
11	0.38	0.31	0.95	0.13	1.77	12
12	0.31	0.15	1.00	0.25	1.71	13
13	0.46	0.23	0.89	0.13	1.71	14
14	0.54	0.15	0.00	0.00	0.69	25
15	0.31	0.08	0.89	0.13	1.41	17
16	0.46	0.31	0.95	0.25	1.97	11
17	1.00	0.77	1.00	0.63	3.40	1
18	0.62	0.46	0.89	0.25	2.22	7
19	0.31	0.08	0.00	0.00	0.39	28
20	0.23	0.15	0.00	0.00	0.38	29
21	0.23	0.08	0.00	0.00	0.31	31
22	0.77	0.92	1.00	0.50	3.19	2
23	0.38	0.38	0.42	0.13	1.31	20
24	0.54	0.54	0.95	0.13	2.16	8
25	0.38	0.15	0.05	0.00	0.58	27
26	0.46	0.31	1.00	0.25	2.02	10
27	0.08	0.08	1.00	0.25	1.41	18
28	0.69	0.46	1.00	0.75	2.90	3
29	0.31	0.08	0.84	0.13	1.36	19
30	0.54	0.23	0.05	0.00	0.82	22
31	0.77	0.46	1.00	0.38	2.61	4
32	0.16	0.15	0.95	0.25	1.51	16

APPENDIX F

SAMPLE EVALUATION

Green-Ways & Rays: Benefits of Shade in Outdoor Play Areas
Evaluation Form

Directions: Read each of the statements below and, in the left half of the scale, rank yourself at the present time after participating in the training. NEXT, think back to your level of understanding about each statement before you participated in the training and rank your before level in the right half of the scale. Circle the appropriate numbers using the following key: 1 = NO UNDERSTANDING 2 =LITTLE UNDERSTANDING 3 = MODERATE UNDERSTANDING 4 = QUITE A BIT OF UNDERSTANDING 5 = COMPLETE UNDERSTANDING

PART I. How would you describe your understanding of the following statements:

1. Your awareness of sun exposure risks and long term implications.

After: <——————————————> Before: <——————————————>
1 2 3 4 5 1 2 3 4 5

2. Your knowledge of the benefits of shade trees in the outdoor play area.

After: <----------> Before: <----------> 1 2 3 4 5 1 2 3 4 5

3. Your skills and knowledge of developing outdoor learning environments.

After: <----------> Before: <----------> 1 2 3 4 5 1 2 3 4 5

4. Your skills and knowledge of basic landscape design concepts.

After: <----------> Before: <----------> 1 2 3 4 5 1 2 3 4 5

5. Your knowledge of follow-up care and maintenance required for trees and shrubs.

After: <----------> Before: <----------> 1 2 3 4 5 1 2 3 4 5

PART II. Rate your level of agreement with the following statements:

a. As more children are cared for in daycare centers, I fell that childcare providers and other educators need to re-evaluate their sun protection practices and become further educated of the risks of sun exposure.

<----------> 1 2 3 4 5 6 7 8 9 10
STRONGLY AGREE AGREE DISAGREE STRONGLY DISAGREE

b. Since lifestyle habits begin at an early age, it is the responsibility of care givers to ensure a natural, safe environment for children to play.

<----------> 1 2 3 4 5 6 7 8 9 10
STRONGLY AGREE AGREE DISAGREE STRONGLY DISAGREE

c. Shade trees are an important component of the outdoor play area.

<----------> 1 2 3 4 5 6 7 8 9 10
STRONGLY AGREE AGREE DISAGREE STRONGLY DISAGREE

APPENDIX G

FIGURES 1 - 13

a

b

c

Figure 1 (Site 1):
a. Offers traditional play equipment located in a natural, shaded environment.
b. The shaded play area is mulched leading into a natural grassed area.
c. Offers areas to develop gross motor skills as well as sensory and cognitive development.

a

b

Figure 2 (Site 2):
a. Small trees such as this Red Maple, will grow to provide beneficial shade in years to come.
b. This garden filled with butterfly bushes, daylilies and grasses which attract many beneficial insects for the children to observe and explore.

Figure 3 (Site 3): This play area is in the full sun throughout the entire day which limits the time children can comfortably utilize the outdoor play space.

Figure 4 (Site 4): The lack of shade trees on this play area is considered a burden by teachers at this center. More shade, perhaps around the equipment would be beneficial.

Figure 5 (Site 8): This Silver Maple is the only element available to provide shade on this school-age play area in North Clarksville.

Figure 6 (Site 11):
a. The play area is partially shaded by the Red Maples positioned on the southeast edge of the play area.
b. Flower-bed made from an old wading pool.

a

b

Figure 7 (Site 12):
a. School-age play area
b. Shade trees, picnic tables and ducks! What more could you ask for?

Figure 8: (Site 13)

Figure 8 (Site 13): Excellent shade areas are provided for the children as they play throughout the day.

a

b

Figure 9 (Site 15):
a. This centers has a large, free-play area that could benefit from trees and small shrub planting.
b. Three Red Maples have been planted for future shade.

a b

Figure 10 (Site 20):
a. School-age play area.
b. Infant-toddler area.

Figure 11: (Site 21)

Figure 11 (Site 21): The play area is located on an asphalt parking lot making it a virtual heat island.

Figure 12 (Site 25):
This play area receives sun all day long rendering this artificial shade virtually worthless.

Figure 13: (Site 26)

Figure 13 (Site 26): This center reflected a low rating of frequency of species and related landscape elements.

VITA

Karla Kristine Kean graduated in May of 1997 from Southwest Missouri State University, Springfield Missouri, with a Bachelor of Science Degree in Horticulture and a minor in Agronomy. After accepting a position with the University of Tennessee Extension Service, she and her family relocated to Clarksville, Tennessee in March of 1998 where she is currently employed as an Extension agent in Montgomery County.

Currently, her employment responsibilities are split between 4-H Youth Development and Adult Agriculture, primarily Horticulture programs. Karla is an active member of the Tennessee Association for Agriculture Agents and Specialists (TAAA & S) and the National Association for Agriculture Agents (NACAA). Through this association she has gleaned many awards for marketing and communication efforts. In addition to these accomplishments, Karla has served as secretary with the Clarksville Tree Board for the past five years, and is an active member of the Tennessee Urban Forestry Council.

Karla plans to continue efforts to raise awareness of the value of shade in outdoor learning spaces and to educate citizens about urban forestry issues by providing horticulture education programs to childcare educators, landscape designers, architects and others in the green industry.

> *Everyone who achieves success in a great venture, solved each problem as they came to it. They helped themselves, and are helped through powers known and unknown to them at the time they set out on their voyage. They kept going regardless of the obstacles they met.*
>
> *W. Clement Stone*