

# 基于参与式的美国幼儿园环境营造及循证研究

## Community-based Approach for Preschool Design and Evidence-based Research in the United States

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**摘要：**亲自然对于儿童的身心健康意义重大，快速城市化带来的环境退化和潜在不良影响会对人类健康福祉产生巨大挑战，本文结合美国联邦和州政府资助的儿童研究与实践项目，通过分析项目开展的特点、程序及实施过程中获得的经验教训，探讨基于参与式的美国幼儿园环境设计项目开展的具体途径与方法，为促进我国儿童与自然的直接接触、提高户外学习环境的质量带来启示。

**关键词：**参与式设计；户外学习环境；儿童；健康；启示

**Abstract:** Access to nature has multiple physical and mental benefits for children. Rapid ongoing urbanization poses the challenge of maximizing the benefits of agglomeration while minimizing the environmental degradation and other potential adverse effects. These effects could present great challenges to human health and well-being. This article introduces the lesson learned from participating in several federal and state funded research and design projects, including their specific targets, procedures, and processes, that aims for the community-based design approach in the United States. The implications help further the design research of children's contact with nature as well as the improvement of quality outdoor learning environment in China.

**Key words:** participatory design; outdoor learning environment; children; health; Enlightenment

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## 引言

城市在提供便利设施和资源的同时,也带来了诸如空气污染、噪声、缺乏与自然接触以及社会经济差异等问题<sup>[1]</sup>。研究表明,城市绿地可提供一系列社会、经济、健康和环境效益,如提升身心健康、降低肥胖率、减轻压力并提高社会凝聚力<sup>[2-5]</sup>;注意力恢复理论和压力减轻理论研究都表明,小型绿地也有助于减轻心理压力<sup>[6-7]</sup>;绿地质量与数量一样重要,有研究认为健康程度与绿地质量呈正相关<sup>[8-13]</sup>。

快速城市化一方面给人们带来了诸多益处,另一方面也限制了人们亲近自然的机会,对于儿童来说更是如此。许多研究都显示儿童亲近自然有益身心健康、提高认知行为水平、减轻压力、增强与他人的社交情感联系<sup>[14]</sup>。但同时,研究也显示,与过去相比,现代儿童更多地在室内久坐而非户外运动。近年来,自然化学校场地的概念逐渐被民众所熟知并被认为是可以让儿童更加亲近自然的方案,设计师们就如何在设计中准确地表达儿童需求展开了大量讨论。参与式设计是一个从社会科学中提炼出的方法,通过合理规划社区里不同利益相关者之间的合作方式及资源供给,达到实现公平且可持续的设计方案的目的<sup>[15]</sup>。参与式设计能够为解决城市化问题提供创新且有共识的方法,同时在面对设计中的诸多不确定性和挑战性问题时,提供解决问题的思路<sup>[16]</sup>。美国联邦和州政府通过各种研究及实践项目,专项资助微小绿地环境建设,以促进未来儿童友好型城市环境的建设。项目注重将生态、生物多样性引入日常生活,从而让孩子和家长能够走出家门,亲近自然,并理解人

和环境相互依赖的关系。NLI (Natural Learning Initiative) 隶属于美国北卡罗来纳州立大学设计学院，以关注参与式儿童户外环境设计、注重环境对身心健康影响为宗旨，主持了多项相关的研究类实践项目。笔者于 2017 年 — 2020 年在 NLI 工作，直接参与了多个项目的开展。本文选择其中两个代表性的案例，Shape NC III 和 USDA COLEAFS，通过分析其特点、程序及实施过程中获得的经验教训，探讨基于参与式的美国幼儿园环境设计项目开展的具体途径与方法。旨在通过多方参与的形式促进儿童与自然的联系，为提升儿童户外学习环境质量提供参考。

## 1. 自然化空间改造设计项目：Shape NC III

### 1.1 项目开展背景

在美国，高肥胖率带来了医疗保险支出的激增，在北卡罗来纳州，每 10 个家庭的两至四岁儿童中就有 3 个超重或肥胖。同时，38% 左右的儿童在幼儿园食用双餐，每日的活动时间也在幼儿园度过。因此，幼时养成良好的饮食和生活习惯可能成为防止日后肥胖的关键。

正是在这样的大背景下，Shape NC III 期望通过早期干预来降低日后肥胖的概率。项目由联邦 CNCS 资助，旨在吸引社区参与，将传统操场变为户外学习环境，帮助学龄前儿童获得更多的体育活动、户外学习机会，让儿童在自然环境中享受寓教于乐。该项目基于 NLI 在 2007 年启动的建筑环境自然化的理念，并采用多方参与的形式，以达到高效的项目产出。



NLI 现场施工  
Site Construction by NLI



Kids Korner Academy II 改造前  
Kids Korner Academy II Before Transformation



Kids Korner Academy II 改造后  
Kids Korner Academy II After Transformation



NLI 项目总监 Dr.Nilda Cosco 在社区设计研讨会上  
Project Director of NLI—Dr.Nilda Cosco at the Community Design Workshop

## 1.2 环境评估工具：COLEQT

改造有效性评估使用了由 NLI 开发的针对物理空间环境评估的工具 COLEQT。该工具帮助幼师和学校管理人员对现有自然环境、室内外关联性，以及空间特性进行分析评估，

从而为之后的针对性改造提供依据。其中最佳实践指标是 COLEQT 的核心,分别包括:(1) 大于等于 10 个的游戏和学习场所;(2) 环形弯曲的循环主路;(3) 集体活动的大型开放草地;(4) 足够的遮阴;(5) 天然的灵活组件;(6) 足够多的轮式玩具和便携器具;(7) 大幅运动的活动设施;(8) 聚集空间;(9) 足够且安全的储存空间;(10) 为全班提供农产品的菜园;(11) 树木,包括灌木与藤本;(12) 可食植物。

### 1.3 项目开展难点

#### 1.3.1 经费使用

由于该项目全部由美国联邦政府资助,所以在经费使用方面有诸多限制。例如,为了避免增加房产价值,原则上资助经费不能用于硬件设施营造。但由于州政府规定儿童在户外活动空间须使用围栏围合,因此许多社区为满足此要求不得不通过自筹资金来保证项目符合规定。

#### 1.3.2 施工方的选择

为更好地支持当地社区,NLI 负责联系承包商或风景园林师,通过协调促进当地儿童合作组织与 NLI 所在地的承包商达成合约,以避免由于联邦政府项目盈利低、体量小、施工过程漫长而找不到合适承包商的问题,多项目同时签约也意味着成本的进一步降低(图 1)。

#### 1.3.3 可持续性的改造与后期维护

当地社区面临的另一大挑战是能否坚持可持续性的改造与后期维护。例如,为解决位于达勒姆郡的一个幼儿园缺乏户外遮阴以及缺乏排水系统等问题并节省资金,由幼儿园组织家庭活动,邀请有时间的家长参与改造设计,通过这种参与式设计的形式使幼儿园节省了几千美元,并用这笔资金去解决场地排水问题,还安装了遮阳帆和盆栽树(图 2—图 3)。

### 1.4 项目启示:多方参与讨论构建社交网络体系

该项目最重要的一点就是帮助利益相关者构建一个长期维持和运作的体系。通过现场勘察后,在北卡罗来纳州立大学举行参与式设计研讨会(图 4),NLI 就项目目标和户外学习环境的优势进行讲解,并在最后由各组分别展示概念性总体规划。与此同时,每年为幼师和技术助理安排学习交流(图 5—图 6),邀请之前参与项目的幼师、园艺系教授,分享他们在维护户外学习环境中的经验,以及从家长、公司和组织那里获得资金的案例。这种参与式的设计研讨会为多方提供了交流的机会并构建了良好的社交网络体系。

多数户外学习环境景观设计采用以设计师为主导的方式,对儿童的行为习惯和实际需求考虑存在偏差。而参与式设计建立在充分考虑使用者需求的基础上,由设计团队、政府

管理部门与使用者等相互协作配合，共同商议制定科学的改造方案。该项目着重突出了在参与式设计过程中形成的纽带关系以及项目完成后的延续。这要求各方利益者拥有共同愿景，从而促进例如筹款、社区参与和执行计划等相关事宜的顺利展开。



NLI 项目总监 Dr.Nilda Cosco 在一次托儿机构合作学习期间讲话  
Project Director of NLI—Dr.Nilda Cosco Speaks During a  
Provider Learning Collaborative Session



NLI 主管 Robin Moore 教授在一次助教会议上向威克县的技术助理做介绍  
Director of NLI—Professor Robin Moore, Presents to the Technical Assistants of Wake County at a TA Meeting



在 NLI 工作人员和志愿者在场的情况下，孩子们品尝蔬菜  
Children Taste Vegetables in the Presence of NLI Staff and Volunteers



## 2. 参与式儿童园艺研究实践：USDA COLEAFS

### 2.1 项目背景

园艺活动日渐被视为潜在的预防儿童早期肥胖的有效干预手段，越来越多的研究尝试探究其干预效果。关于蔬果种植及消费的研究还处于初级阶段，USDA COLEAFS 旨在研究将园艺（蔬果种植及消费）纳入学前教育从而预防肥胖的有效性。长期目标是帮助学龄前儿童形成健康的生活方式，包括增加体育活动及消费新鲜蔬果的理念。本次共有 15 家符合试验要求的幼儿园参与到三组的试验研究中，严格的随机对照试验确保每个幼儿园接受相同的试验处理。如果能够科学地证明此项试验的有效性，可为政策制定者采纳这一实践并加以推广提供依据。

### 2.2 项目开展过程

#### 2.2.1 试点研究

为测试实验可信度和内部效度，NLI 在一些幼儿园进行试点研究。在整个植物的生长季，NLI 监测如病虫害等问题以确保后续研究顺利进行。研究发现最具挑战性的问题之一是教师的高离职率，这使得一些中心很难保持试验过程的一致性。

#### 2.2.2 实验数据收集

这项研究主要采集三个数据：体育活动量、蔬果喜好度及其消费量（图 7—图 9）。对于体育活动，当孩子到达幼儿园时，开始佩戴计数器，用以收集活动时间内的运动数据，当离开中心时被取下。蔬果喜好调查通过对孩子进行测试来确定他们对蔬果的认知。研究期间多次调查儿童蔬果消费量随时间的变化情况，并与蔬果喜好度调查结果进行比对分析。

### 2.3 项目启示：有效沟通及融洽关系

学术研究和现实生活有很大差异。研究人员对研究结果感兴趣从而得出结论，但公众并非如此。因此，和参与者之间建立有效沟通和融洽关系对于研究成果至关重要。比如在 USDA COLEAFS 项目实践的过程中，笔者倾听来自班级幼师的建议，由幼师来为儿童佩戴、摘取计数器，将晦涩难懂的试验目的以儿童喜闻乐见的方式表达，并且全程对数据进行详尽的记录，最终取得令人满意的结果。与此同时，与儿童建立了良好沟通，儿童的积极配合也促进了项目的顺利开展。

因此在国内户外学习环境设计与研究的项目中，也应重视与幼师和儿童之间的有效沟通，提前掌握儿童的行为与心理特征，尊重其实际需求，在儿童与幼师的共同参与下，提高儿童户外活动种类和质量、增强儿童与自然的联系、促进儿童身心健康。

### 3. 结语

在过去几年中，笔者参与了许多相关的环境设计和研究项目，旨在为儿童提供自然化的户外学习环境。从教师和社区收到的反馈表明，引入自然化的户外学习环境有很多益处，特别是增加了儿童的体育活动。

NLI 的循证设计理念很大程度上指导设计如何在现实中实现，例如，在 Shape NC III 中，最佳的实践方式是综合 NLI 的相关研究成果，并通过多年的试验不断优化改进得出的。另一方面，在风景园林设计领域较少会通过针对性的量化评价检验设计结果，在 USDA COLEAFS 项目中，NLI 开展随机控制实验研究，实现了从理论方面来佐证设计理念的有效性。基础研究与设计实践互为参考与支持，显示了基础研究对设计实践的重要指导作用，同时也显示其互补性带来的良性循环。本文阐述的两个案例展现了美国通过高效沟通、多方合作等参与式景观设计与研究模式来增加儿童户外活动时长以及消费新鲜蔬果的理念，从而降低儿童的肥胖率。这对于以增加儿童与自然环境的直接接触、提高户外学习环境质量、促进儿童身心健康为宗旨的儿童户外环境设计具有一定的借鉴意义。

#### 注：

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NLI 工作人员为儿童测量身高和体重  
NLI Staff Measure the Height and Weight of Children



幼师与儿童参与蔬果种植  
Teachers and Children Grow Vegetables and Fruits

## **Introduction**

Cities that are complimented of being closer to amenities and resources have also created environmental and social stressors, such as air pollution, noise, lack of access to natural environments, and socioeconomic disparities<sup>[1]</sup>. Studies have shown that urban green space can provide a range of social, economic, health, and environmental benefits, including increased physical and mental health, decreased obesity rate, reduced stress level and improved social cohesion<sup>[2-5]</sup>; Both Attention Restoration Theory and Stress Reduction Theory indicate that even small greenery can help reduce psychological stress<sup>[6-7]</sup>; Park quality could be as important as park quantities and a general thought is that health degree is positively correlated with the quality of green space<sup>[8-13]</sup>.

The rapid urbanization in China on the one hand has provided multiple benefits for people, on the other hand, however, people are seeing less opportunity to be in contact with nature, especially for children. Many studies have shown that children's access to nature benefits physical and mental health, improves cognitive and behavioral levels, reduces stress, and enhances social and emotional connections with others<sup>[14]</sup>. However, studies also show that current generations of children are spending less time outside while with an increased sedentary time indoors. In recent years, greening or naturalizing schoolyards have been brought to the attention of many practitioners and being recognized as a solution to provide opportunities for children to be in contact with nature again. However, how to properly address the needs of children has been discussed broadly among designers. Community-based design is an approach derived from the social sciences that offers technical assistance and enhanced commitment to local capacity through the form of participation of communities, including various stakeholders and their associated resources, for the creation of a sustainable and equitable solution to address their needs<sup>[15]</sup>.

Through the implementation of such approach, it is likely to tackle the common problems innovatively and collectively and allows for the continuous learning to keep up with challenges or uncertainties as well<sup>[16]</sup>.

The US federal and state governments have implemented multiple research and design initiatives in hoping to create a better built environment for future generations through urban greening interventions. Those projects focus on bringing biodiversity and ecology into daily life to 'push'

children and parents out of their houses and enjoy nature, so that they would understand the interdependent relationship between human and non-human world. The Natural Learning Initiative (NLI) at NC State University aims to provide and promote participatory-based naturalized outdoor learning environment that supports better connection between children and nature and has successfully launched many projects. During the year 2017 and 2020, the author was involved in several federal and state level funded research and design projects. Two projects, Shape NC III and USDA COLEAFS, were selected with the lesson learned from to represent their unique targets, procedures, and processes of participation-based environmental design projects for preschool that focuses on children of at-risk communities in the United States. It aims to promote the connection between children and nature through multi-participation and bring reference for improving the quality of children's outdoor learning environment.

## **1. Naturalizing Playgrounds: Shape NC III**

### 1.1 Background

In the US, people are seeing a rise in health care costs that is associated with high obesity rate. And in the state of North Carolina, roughly three out of every 10 kid's ages two to four years from the at-risk families are overweight or obese. At the same time, approximately 38 percent of the young children are enrolled in childcare centers, where they spend most of their active hours, as well as most of their food consumption for the day. Thus, it becomes crucial to ensure adequate physical activities, as well as nutritious food to prevent the likelihood of young kids becoming obese adults.

Shape NC III is created thus in hoping to take a preventative approach to tackle this problem. Funded by the US federal agency, Corporation for National and Community Service (CNCS), Shape NC III is a multi-year design project that aims to engage local communities and assist preschool children, especially those that come from at-risk communities, to enjoy the opportunities of increased physical activities, outdoor learning opportunities. The transformation allows the children to learn outside the traditional boundary of a classroom in a naturalized setting. The cornerstone of the project is based on the design philosophy that the Natural Learning Initiative (NLI) at NC State University has launched in 2007 that uses action-research health promotion strategy to naturalize the built environment. It is also through the adoption of

community-based approach to achieve the maximum outcome possible. 1.2 Environmental Assessment Tool: COLEQT To assess the efficacy of the renovation process, an evaluation tool called Childcare Outdoor Learning Environments Quality Tool (COLEQT), developed by the NLI that provides a comprehensive assessment on the physical environment was used. The goal of this tool is to provide a checklist for the childcare providers and administrators to improve the quality of utilizing the physical environment, increased interactions between teachers and children, and the integration of indoor and outdoor education.

Best Practice Indicators (BPI) are the core components to accurately perform the assessment of the COLEQT, including (1) ten or more play and learning settings, (2) a looping, curvy primary pathway for circulation, (3) large open grassy area for group activities, (4) sufficient shade for a group of children, (5) a variety of natural loose parts for children to play with, (6) sufficient wheeled toys and portable equipment for children, (7) the Outdoor Learning Environment (OLE) supports gross motor activities, (8) a designated gathering space, (9) sufficient and secure storage units/sheds for toys and equipment, (10) a vegetable garden that can supply enough produce for the whole class, (11) trees, including shrub and vines, and (12) edible plants available.

### 1.3 Challenges

#### 1.3.1 Funding Expenditure

Since the project was fully funded by the United States federal government, there are many restrictions on the way of spending money. For instance, one of the specific restrictions from the guidelines in using the money is to not adding any potential features that could increase the property value. Due to the state regulation that a fenced-in area for children to play outdoors is mandatory, many centers had to work hard to fundraise to meet the federal and state requirement.

#### 1.3.2 Contractor Selection

To better support these childcare centers from those neighborhoods, the NLI helped to get them connected with contractors or landscape builders. In addition, NLI will help local partnership for children to coordinate the centers from the same cohort to seek for the same contractor from Wake County to avoid not being able to find contractors due to low profits, small size, and long span natures of the federal projects. Signing contract at the same time would usually get a bulk price for the cohort to save money as well (figure 1).

#### 1.3.3 Sustainability and Maintenance

Another challenge for local communities is whether they can stick to the action plans and make incremental upgrades to their OLE overtime. For instance, a center is located in Durham County with little shade in summer and poor draining system during hurricane season. To save money, the childcare center invited available parents to participate in a family day event to jointly renovate the OLE. By doing this, the center was able to save thousands of dollars and they used the money to add shade sails and tree planters on site while fixing the sitting water issue as well (figure 2, 3).

#### 1.4 Implications for Community-scale Networks

The core of the project is to help form a strong alliance among those important stakeholders to create a visionary plan that can sustain and function in the long run. After the site measurement, each county would be scheduled a participatory design workshop held at NC State University (figure 4). The NLI would give a few presentations on the purpose and the advantages of outdoor learning environment. By the end of the workshop, each conceptual master plan would be presented to the same cohort. Learning collaboratives were scheduled for both the childcare providers and for the technical assistants from local partnership for children each year (figure 5, 6). During these collaboratives, the design team from the NLI had invited guests from multiple areas such as owners and teachers from previous participated centers, professors from Horticulture department at NC State, to share their experience in maintaining naturalized OLE and success stories of getting continuous fundraising support from parents, companies, and organizations. This participatory design workshop offers opportunity for brainstorming, communication, and networking for designers, childcare centers, and the local partnership. Many of the outdoor environment projects followed the pathway of prioritizing designers' knowledge base over actual contextual needs and the child's behavioral patterns. The form of community-based workshop builds on the foundation of users' needs. The design team, the government management department and the users collaborate with each other to jointly formulate a scientific renovation plan. The Shape NC III project really accentuates the important continuity of strong networks built during the community-based design processes and extends this form of collaboration after the completion of projects. This requires the consensus made among actors of various levels that share common visions which allows the flexibility of managing the institutional arrangements, such as fundraising, community input and participation, and implementation of action plans.

## **2. Gardening-based Early Age Participatory Research: USDA COLEAFS**

### 2.1 Project Background

As gardening activity is proven to be potentially effective in preventing obesity during early childhood, more studies try to understand their interrelations. However, research that focuses on Fruit and Vegetable gardening (consumption) is under-researched. Funded by the US Department of Agriculture, Childcare Outdoor Learning Environments as Active Food Systems (COLEAFS) is a multiyear research project that aims to investigate the effectiveness of incorporating gardening activities in preschool setting as an obesity intervention strategy.

The long-term goal is to help preschool children form a healthy lifestyle that involves increased physical activity and consumption of fresh produce from the early exposure to gardening activities at a young age. Fifteen centers meeting the selection criteria were randomly assigned to three groups, this rigorous randomized controlled trial (RCT) research ensures each childcare center receive the same treatment over the course of the research period. If this intervention can be scientifically proven to be effective, it could provide a basis for policy makers to adopt this practice and expand it.

### 2.2 Project Development Process

#### 2.2.1 Pilot Study

To test the protocol, reliability, and internal validity, a pilot study was conducted in a few centers by NLI with the help of local partnership for children. During the whole growing season, the NLI staff monitored carefully on the potential challenges, such as disease and pest problems, to ensure the installation would be successful and smooth when the research starts. One of the most challenging issues during the pilot study that the research team had found was that the high turnover rate among preschool teachers which made it hard for some centers to stay consistent.

#### 2.2.2 Data Collection

The research focuses on three main datasets, the physical activity, the fruit and vegetable liking surveys, and the fruit and vegetable consumptions (figure 7, 8, 9). For physical activities, each kid was asked to put on an accelerometer that collects movement data during the active hours when they arrive at the center and was taken off when they leave. The vegetable and fruit linking survey tests children to determine their knowledge of fruits and vegetables. The changes in



children's vegetable and fruit consumption over time were investigated and compared with the results of the vegetable and fruit preference survey.

### 2.3 Implications for Interpersonal-scale Communication

There is a big difference between the academic world and real life when it comes to purposes and intentions. However, the public might not have a curious mind of knowing the cause and effect, but the phenomenon presented in front of them. Thus, effective communication and building rapport become crucial for successful research. During USDA COLEAFS, the author has built a good relationship with the teachers and listened to their advice for better management. For instance, teachers were the ones that helped with accelerometers and the delivery of research goals to these young kids through language that they would understand. Data was documented in detail throughout, thus, the final results was satisfying. In addition, having a good relationship with a popular kid in class significantly helped in every way. It is worth noticing that effective collaboration from the children also ensures the desired research outcome.

When designing spaces for preschool, it is vital to have an efficient communication with the teachers in order to understand children's behavioral patterns clearly. With the input from preschool teachers, acknowledging the contextual needs will yield an optimal outcome of better connect with nature, improved well-being, and increased outdoor activities and their qualities for the children.

### **3. Conclusion**

Over the past few years, the author has participated in several design and research projects that aim to provide access to naturalized outdoor learning environment for children ranging from infants to elementary school. The feedback received from both the teachers and communities has suggested the benefits of introducing naturalized OLE in, especially, increased physical activities among children. NLI's evidence-based design principles largely directed how projects are implemented on the ground. As shown in Shape NC III, the best practices are concluded through years of trial and error with modifications periodically, as well as findings and implications from research studies on side. On the other hand, the purpose of applying for randomized controlled trial study (such as USDA COLEAFS project), which is not commonly seen in the landscape architecture field, is to further advance the theoretical ground that utilize

such design principles and in combination with empirical evidence to support the mission of NLI. The two projects presented above indicate a complementary relationship between research and design in that neither of the two is independent from the other, thus provide us the implication to better utilize fundamental research to advance the practices in the design field. The two examples here showcase how the hybrid mode of using community-based design and research approach can be used to increase children's physical activity outdoors as well as their consumption of fresh produce in the US. This can shed light on designing programs for increased exposure to nature, improved quality of outdoor learning environment, and better overall wellbeing of children in China.

**Note:**

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