

Reconnecting with Nature: An Assessment of Yi Mi House's Montessori School's Nature Program

An Interactive Qualifying Project

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Abstract

A nature education is a program that provides a curriculum centered around nature and regular outdoor experiences. Nature education is increasingly recognized as a core component of early childhood education programs because nature can be used to foster early childhood development while preparing children to become stewards of the earth. This report assesses the effectiveness of Yi Mi House's Montessori School's (Yi Mi) nature-based educational experience and approach. Through primary and secondary research including parental surveys, instructor interviews, and observational benchmarking, Yi Mi's nature-based educational program was deemed to be effective at nurturing the development and well-being of children. Despite Yi Mi's success, suggestions involving curriculum design, outdoor space, and organizational support are provided for continuous improvement of their nature-based educational program.

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Executive Summary

Project Goal

This project evaluates Yi Mi's nature-based program in fostering the development and well-being of its children. To accomplish this goal, we researched existing theories and systems of nature-based learning in different countries and children's developmental needs about nature. In addition to our research, we surveyed parents and interviewed instructors, the results of which, alongside our research, were used to provide recommendations to our sponsor.

Background

Our background contains the prerequisite information needed to understand the project's context and rationale, inform the methodology, and support our final recommendations for Yi Mi. This research pertained to the Montessori philosophy, the importance of a nature-based program in the Montessori framework, the significance of contact with nature for children's early development, and nature-based approaches in preschools around the world.

Methodology

We conducted surveys and interviews as part of the assessment and data-gathering process to achieve the project's goal and collect primary data. The two target populations we sampled were parents who have children enrolled in the nature program and Yi Mi instructors who engage with the nature program. The questionnaire collected parental data, while the interviews acquired instructor data.

Survey questionnaires allowed for data collection from a larger sample of the parent population. In contrast, interviews allowed an in-depth understanding of instructor observations,

experiences, and opinions. The assessment allowed for the creation of informed conclusions and recommendations regarding Yi Mi's nature program.

Our survey questions were translated into Mandarin and compiled through a digital application called Wenjuanxing by our Hangzhou Dianzi University (HDU) counterpart. The questions were based on our background research and aimed to determine student development from the parental perspective alongside parental satisfaction. Our interview questions were translated into Mandarin, and HDU students conducted interviews under our team's observation. These interview questions aimed to understand instructor opinions on Yi Mi's program and investigate if Yi Mi could apply nature-education approaches from other countries. Our background research regarding the benefits of nature-based programs and their practical implementations informed our interview questions, as well as our observations from other schools in the U.S.

Findings

After collecting survey data and conducting interviews, our team analyzed the information to help evaluate Yi Mi's nature program and formulate recommendations. The results offer insights into various aspects, including student development outcomes, parental satisfaction, student enjoyment, parental concerns, parental awareness of nature education, and the distinctions and commonalities between Yi Mi's nature curriculum and Western curriculums.

The key findings underscore the effectiveness of Yi Mi's nature program in promoting children's development, contributing to overall satisfaction among both parents and children. The program's successful addressing of parental concerns regarding cleanliness and safety contributes to this content. However, instructors note that such mitigation efforts may impact the range of activities and experiences they can offer the children. These concerns may stem from a lack of

understanding among parents regarding the goals and benefits of nature-based education, a sentiment expressed in multiple interviews with instructors. Lastly, some instructors desire to further integrate the nature program into the Montessori program.

Conclusions & Recommendations

From our findings, our team concluded that Yi Mi's nature-based approach is effective in nurturing the development and well-being of children. To provide options for continuous improvement of their nature-based program, we have gathered recommendations for Yi Mi to consider. Our background research and data findings support the recommendations. They fall into three categories: curriculum design, outdoor area design, and organizational support. These recommendations specifically target aspects identified in our data analysis as areas where Yi Mi has potential for improvement.

Many instructors expressed interest in integrating the nature and Montessori programs. To integrate the nature and Montessori programs into Yi Mi's curriculum, the school can consider incorporating more Montessori materials centered around nature. Recent literature shows that taking nature into the indoor learning environment is as important as taking the learning environment outdoors.

Considering the outdoor area, Yi Mi already incorporated a nature zone and school garden into their space, but further enhancement of naturalization in the outdoor area will both facilitate increased interaction with nature and broaden the scope of the nature program. Suggestions include adding an outdoor dramatic play area, replacing artificial flooring with more natural flooring, using natural materials for outdoor classroom seating, and creating a more diversified terrain.

The final recommendation emphasizes the importance of organizational support, specifically through increased parental involvement. As seen in Western schools, encouraging parent volunteering fosters a stronger teacher-parent bond and positively influences parental attitudes toward nature education. Yi Mi could leverage parental volunteers for potential modifications to the outdoor area. Teachers also play a crucial role in educating parents about nature education; fostering a shared understanding among staff enhances the school's message. Moreover, utilizing existing parent-teacher connections in the Montessori program allows for consistent and effective communication about the importance of nature education.

The team encountered challenges in communication, time constraints, and expertise gaps. Language differences with HDU counterparts led to communication difficulties, particularly during presentations. The language barrier extended to data collection, requiring translation assistance. Time constraints limited the exploration of potential areas, such as a comprehensive design layout for Yi Mi's outdoor area. The team, primarily consisting of Computer Science and Robotics Engineering majors, needed to gain expertise in early childhood education and related topics. Despite these challenges, we found the experience rewarding and look forward to future opportunities.

In conclusion, our findings endorse the effectiveness of Yi Mi's nature-based approach. Backed by data analysis, recommendations for improvement include integrating the nature and Montessori programs, enhancing the outdoor area, and increasing parental involvement.

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1. Introduction

Early education is the teaching of children from birth up to the age of six in various academic and nonacademic subjects. Like children in the United States, many children in China receive their formal education in school. In China, three types of early education institutions are available: nurseries, kindergartens, and preschools (Zhu, 2009). Typically, nurseries educate children from 0 to 3 years old; kindergartens cover children from 3 to 6 years old; and preschools focus on 5 to 6-year-olds. Each type of institution has teachers who provide instruction on academic subjects, such as reading, writing, and math. The teachers also cultivate a classroom environment that provides opportunities for interaction. Because children's primary form of learning and self-expression is play, their experiences include activities, like exploring their surroundings, listening to stories, and engaging with toys. The early education experience lays the foundation for the future learning, self-discovery, and social-emotional progress of children (University of Massachusetts Global, 2023, accessed December 28, 2023).

Nature-based education is increasingly being recognized as a core component of early childhood education because it can foster the early development of children while preparing them to become stewards of the earth (Larimore, 2016; Flack, 2022; Natural Start Alliance, 2023). A nature-based education is a program that provides a curriculum centered around nature and regular outdoor experiences. Yi Mi House's Montessori School, a preprimary school in Hangzhou, China with a nature-based program that consists of daily outdoor play and weekly nature classes, is interested in improving its nature-based approach.

The remaining segments of Section 1 aim to provide information about the project. Section 1.1 provides some insight into our sponsor, Yi Mi House's Montessori School, and discusses its product, goal, and business structure. The section draws on insights from

conversations with Kathy Wei, the sponsor liaison for Yi Mi, and visits to the school. Section 1.2 defines the goal of the interactive qualifying project (IQP) study and the objectives for achieving the goal. The examination of the school from an organizational perspective and the specification of the study's goals lays the foundation for the project.

1.1 The Sponsor

The sponsor of the project is Hangzhou Yi Mi Kindergarten Co., Ltd. (Yi Mi). Yi Mi is a set of private schools in Hangzhou, China that educate children from birth up to the age of six using the Montessori philosophy, a method of education where teachers prepare the classroom in a way where students learn through hands-on exploration and self-directed engagement. Yi Mi has three schools: one children's house and two kindergartens. Yi Mi refers to one of the schools as a "Children's House," because it does not meet all the criteria to be labeled as a kindergarten. Altogether the schools consist of three grade levels: *NIDO* (0 – 18 months), *IC* (19 months – 3 years), and *CASA* (3 – 6 years). All three schools serve students from the IC to CASA level; however, two of the three schools serve students at the NIDO level.

Yi Mi has a structure designed for it to carry out its educational goals. Each school has a director, a principal, and a set of nonacademic and academic personnel. The director is the administrative leader and is responsible for representing Yi Mi in matters that include, but are not limited to compliance with governmental policies, facility maintenance, and communication with external organizations. The principal is an educational leader. The principal is responsible for matters that include, but are not limited to curriculum development, faculty recruitment, and student welfare. The set of nonacademic personnel is a body of people who carry out operations that ensure the everyday functioning of the school. They include information technology

professionals, payroll administrators, and cafeteria workers. By working together, the staff creates an environment that is conducive to the teachers' teaching and students' learning.

Within each classroom is a structure designed to support a child's learning. Each classroom has a lead guide, assistant guide, and life teacher. The lead guide is analogous to a teacher; he or she is responsible for organizing the Montessori curriculum, carrying out daily activities, and communicating with parents. The assistant guide helps the lead guide by preparing the classroom environment, assisting with nap times, and resolving conflicts among students. The life teacher maintains the classroom's cleanliness and orderliness by regularly tidying and sanitizing the classroom. By working together, the lead guide, assistant guide, and life teacher orchestrate learning experiences for children.

Yi Mi's mission is to provide an early education that prepares its students for primary education while laying the foundation for its students to grow into curious learners, independent thinkers, and responsible members of society. To achieve this goal, the organization provides programs inside and outside the classroom. Inside the classroom, students engage with their senses, daily life tasks, and academic subjects. Outside the classroom, students can engage in physical activity, pottery, and nature classes. The combination of programs lays the foundation for the future growth and learning of Yi Mi's students.

1.2 Project Goal & Objectives

Children are becoming increasingly disconnected from nature due to urbanization and the increasing number of children being introduced to technology early in their lives (Keith et al., 2021). Like many schools that recognize the importance of nature-based education, Yi Mi has a nature component to its early childhood curriculum. To further bridge the gap between children and nature, Yi Mi wants an assessment of its nature-based approach. The goal of the project is to

evaluate Yi Mi's nature-based program in fostering the development and well-being of its children. Through the evaluation, the project aims to validate the effectiveness of Yi Mi's program, provide recommendations to enhance its effectiveness, or both.

To accomplish the goal of the project, the project will aim for the following two objectives: (1) determine to what extent parent and instructor perspectives align with the benefits of nature-based approaches and (2) to understand what research-backed nature-based approaches can be applied to enhance Yi Mi's program.

1.3 Remainder of Project Report

The background section is the next section and will contextualize the project by examining the Montessori philosophy, the impact of nature on early childhood development, the evolving relationship between children and nature in the modern era, and the factors deemed to be effective practices for nature education. The exploration sets the stage for subsequent sections of the project by offering an understanding of the elements that contribute to delivering a nature-based education in a Montessori environment. This section focuses on providing background and secondary research findings that inform the methodology, study findings and recommendations.

Then we introduce methodology discussion in the next section. The methodology section provides details on the three methods used to gather primary data – surveys, interviews, and case study observations – as well as the anticipated limitations of the methods. While providing details of the three methods, it will outline the plan that was used to carry out each of the methods. The methodology is significant to the project because it explains how the study was conducted and how conclusions were drawn.

The findings and discussion section follow the methodology section. This section provides insights gained from analyzing survey and interview data and relates it to previous

research on the topics covered in this project. The insights will define different dimensions of Yi Mi's nature program, such as student development outcomes, parental satisfaction, and student enjoyment. The findings in the section analyze the effectiveness of Yi Mi's program and provide evidence for the final recommendations to Yi Mi.

The conclusion and recommendations section concludes this report. The section provides suggestions Yi Mi can consider for further enhancing its nature program for its students. Recommendations are summarized into three categories: physical space, curriculum design, and organization support. The recommendations aim to offer actionable insights for improving Yi Mi's nature program; as well as maintaining dimensions that seem to be effective.

2. Background

This section provides background and foundational information for understanding the context and rationale behind the project, especially utilizing secondary research from the published literature and studies. The information will inform the methodology, provide a theoretical foundation that can be used to analyze results from the study, and support the final recommendations for Yi Mi.

Section 2.1 provides background on Yi Mi's educational approach by exploring the Montessori philosophy and detailing its origins, principles, and practices. Section 2.2 assesses the importance of a nature-based program in the Montessori framework. Section 2.3 provides an understanding of the significance of contact with nature for early childhood development. Section 2.4 provides insights into how contact with nature for children's early development by exploring how urbanization and technological innovations have shaped the interactions between

children and nature. Section 2.5 reviews nature-based approaches in different countries as presented in the published literature.

2.1 The Montessori Philosophy

The Montessori philosophy was developed by Maria Montessori (1870 – 1952). At the time she was one of Italy’s few doctors who specialized in psychiatry and pediatrics. After earning her credentials from the University of Rome, she worked as an assistant physician at a Psychiatric Clinic in Rome, engaging with disabled children who were described as “idiot children” (Lumenlearning, 2023). While working with children with disabilities, she realized that for the children to learn, they needed a pedagogy that engages their five senses, i.e., sight, sound, smell, taste, and touch. In 1900, the Orthophrenic School of Rome, a school for children with developmental disabilities, gave her the opportunity to develop and apply her pedagogy by appointing her as the school’s director. When her students began performing as well as children with no developmental disorders, she wondered whether her pedagogy could be passed onto the education system in Rome.

She opened her first school called “Casa dei Bambini” (“children’s house”) for 3-7-year-olds from low-income families in 1907. Through experimentation and observation, she learned children could build their identity, knowledge, and skills through hands-on, self-directed activities in a prepared environment. Her pedagogy began to circulate and inspire educators around the world. Today, thousands of schools around the world, particularly kindergartens, employ the Montessori method (The Montessori Foundation, 2023).

Because Montessori students learn through hands-on exploration and self-directed engagement, the Montessori method is a child-centered approach to fostering the holistic development of children. The goal of a Montessori education is to “allow the child’s optimal

development (intellectually, physical, emotional, and social) to unfold” (Marshall, 2017, p.1).

The aim of a Montessori education is to raise children through a natural process, where they explore their own interests, make their own choices, and learn at their own pace. This approach is different to many traditional methods of education in which children typically grow through a standardized process, where they learn the same subjects at the same pace under the direction of a teacher.

Two key unique elements of the Montessori approach that make it effective are: (1) the learning materials; and (2) the self-directed nature of children’s engagement with the materials (Marshall, 2017). The learning materials are sensorial. Sensorial materials are objects that refine senses. In a Montessori environment, sensorial objects are designed to exercise a child’s senses and prepare them for academic subjects, such as English, math, and science. An example of a sensorial object that is used in many Montessori classrooms is the pink tower—a set of 10 blocks that increase in volume by 1 cm^3 . Children who engage with the pink tower tend to organize the blocks in increasing increments of 1 cm^3 ; developing their sense of dimension and introducing them to the concept of volume. For sensorial materials to be effective, children need to be engaged with the material for an uninterrupted period at their own rhythm. For example, if a child wants to engage with the pink tower, they must reserve a space large enough for the tower’s mat, carry the blocks to the mat, build the tower, disassemble it, and finally, put it back in its original packaging and location. Throughout the process, the child may work with another student and the teacher may guide the child if they are struggling to get started or to complete a task. The multistep process develops a child by building their autonomy, motor skills, and ability to interact with others.

2.2 The Role of Nature in the Montessori Approach

Nature is a fundamental aspect of the Montessori educational experience. Dr. Montessori incorporated nature in her first Children's House in Rome by establishing a gardening area in the school courtyard (Montessori, 2013). This area had a stretch of land lined with trees; the trees provided shade and a natural atmosphere for the children. Dr. Montessori divided the garden area into separate plots, with each plot assigned to a child. Through the process of sowing, hoeing, and watering, students developed their experience in gardening and plant cultivation. To Dr. Montessori, nature is vital to the development of children because it is an inherent part of their being (Bertolino & Filippa, 2021).

Besides aligning with Dr. Montessori's educational approach, a nature education can be viewed as an extension of the indoor education the Montessori method provides because nature can be the "prepared environment" (Chawla, 2014). Similarly, a Montessori classroom offers opportunities for hands-on, self-directed learning through its use of sensory materials, nature offers opportunities for self-directed, hands-on learning through natural elements, such as plants, insects, and landscapes. By synthesizing the earlier discussion of the Montessori philosophy and the concept of nature being a "prepared environment", Montessori children with a nature education can experience both worlds: a child-centered, hands-on, and holistic approach to learning that takes place both indoors with Montessori materials and outdoors through natural materials.

2.3 Why Children Need Nature

Nature is suited to children's development, learning, and self-expression by providing many opportunities for play. Outdoors children are surrounded with diverse habitats and natural materials. Habitats—such as forests, coastlines, and ponds—allow children to observe and

interact with life forms such as insects, birds, and fish. Natural materials, such as dirt, grass, and branches can be tools for imaginary play.

While many opportunities exist in natural areas—such as, forests—the opportunities to engage with nature are also available in cities through green spaces, such as playgrounds, zoos, and botanical gardens. Numerous studies on nature-based programs for children provide evidence of the benefit of connecting children with the natural world (see Ardoin & Bowers, 2020 for a comprehensive literature review). The programs have enhanced child development across five domains: environmental literacy, cognitive development, social-emotional development, physical development, and language and literacy.

Environmental literacy is an understanding of the natural world's entities and processes. When children are outdoors, they can observe and interact with various animals, plants, and ecosystems. Through observations and interactions, children can build an awareness about the biodiversity and interconnectedness of all living things. By building an early connection with nature, children are likely to foster a sense of environmental stewardship later in life (Ernst et al. 2021; Wilson, 2008). A sense of environmental stewardship in children will be important for addressing global issues, such as climate change, in the future.

Cognitive development involves enhancement of thinking and reasoning. When children play in natural environments, they have opportunities to problem-solve. The problems can include navigating a rocky path or constructing a shelter out of branches and leaves. Problem solving in a natural environment can enhance several aspects of a child's physical development, such as their attention span, concentration, and even self-discipline (Driessnack, 2009; Chawla, 2015; Bento & Dias, 2017). Interactions with nature can also mitigate symptoms of attention-deficit and hyperactivity disorder (ADHD) (Faber et al., 2002).

Social-emotional development means improving abilities to express feelings and maintain relationships with others. During nature play, children tend to work together on projects that typically include exploring the natural environment, role-playing, and constructing structures out of natural materials. During this process, children learn to communicate with others and navigate conflicts. Nature-based education can generate more positive peer play and learning (Burgess & Ernst, 2020); social-emotional benefits can prepare children for academic success.

Physical development means improving the use and control of one's body. Because fine and gross motor skills allow children to carry out everyday tasks, it is imperative that kids develop these skills. Nature develops children's fine and gross motor skills by offering them opportunities to interact with natural sensorial elements, such as rocks, flowers, and pinecones (Wilson, 2008). In addition, the variations in elevation and slopes found in natural terrains challenge a child's coordination, balance, and strength. By engaging with natural materials and uneven surfaces, children hone their physical capabilities.

Language and literacy are the ability to understand and use language. Many children are curious about the world. Because nature is home to millions of animals, habitats, and processes, children tend to formulate questions and seek explanations for the natural phenomena they observe. By inquiring and learning about the natural world, they can enhance their vocabulary and improve their ability to articulate ideas. Interactions with the nature world can promote children's language development by challenging them to use language and more complex language (Prins et al., 2023).

2.4 Modernity and the Child and Nature Relationship

The modern relationship between children and nature is influenced by increasing urbanization and technological advancement. Urbanization is the phenomenon where higher

proportions of a population live in dense city environments. As more people live in a city, the city expands and natural spaces, such as forests and grasslands, are replaced with roads, buildings, and apartment complexes; thereby, depriving children of opportunities to interact with nature. In 1980, 19% of China's population lived in a city and in 2022, 64% of China's population lived in a city (National Bureau of Statistics of China, 2023). If the trend continues, future Chinese children face limited green environments necessary to foster their connection with the natural world.

While urbanization has squeezed out natural spaces and transported people from rural locations, technology has deterred children from spending time outdoors. As children spend more time using smartphones, playing video games, and surfing the web, they have less time for outdoor activities, like playing on the playground, cycling, and picnicking. Chinese children are spending more time using technology and less time outdoors (Wang et al, 2020). Although research has not established a link between screen time and time spent outdoors, the increases in screen time and decreases in outdoor time raises questions about the potential displacement of outdoor time.

Urbanization and increasing technological over-reliance have resulted in a growing disconnect between children and nature. The disconnect has been described as *nature deficiency disorder* (Louv, 2008). Although nature deficiency disorder is not yet recognized as an official medical condition, experts are linking the condition to childhood obesity, myopia, and depression (Driessnack, 2009; Louv, 2008) – each of which are prevalent issues in China (Hunt, 2009; Xinyan, 2012).

2.5 Nature-Based Approaches in Preschools

Nature-based approaches in preschool education have recently gained attention due to global challenges and their benefits for early childhood development (Vinces, 2021). A nature-based program promotes educational objectives by taking the classroom outdoors or by incorporating elements of nature into a built environment. The approaches can vary in scale. Large-scale nature-based approaches include forest schools, outdoor classrooms, and farm-based preschools. Small-scale nature-based approaches include school gardens, green schoolyards, and adventure playgrounds. Despite the varying ways schools are implementing a nature education, the establishment of school gardens, the design of the outdoor area, the indoor integration of natural elements, and parental involvement are important aspects in integrating a nature program.

2.5.1 School Gardens

School gardens can foster holistic development and a connection with nature. A school garden is an area within an institution where students are taught to grow and care for flowers and vegetables. Although school gardens vary in scale, the level of participation, and how they are incorporated within a curriculum, allow them to share a common goal of enhancing the educational experience, nurturing life skills, and promoting environmental awareness.

Studies show school gardens can make a difference for students and their schools. (Ozer, 2007). School gardens offer a multitude of student improvements including moral development, academic learning, and parent-child-community interactions (Alexander et al., 1995). School gardens also contribute to stronger connections to school, enhanced interactions among peers, greater parental engagement, and higher consumption of vegetables and fruits (Ozer, 2007).

Schools can have heritage-focused or nutrition-focused gardens (Barlow, 2007). Heritage gardens contain and commemorate plants and aesthetics from a historical era. Nutrition gardens

are used to grow edible plants, such as fruits, vegetables, and herbs. Heritage gardens introduce students to the preservation of biodiversity by educating students about plant types and the plant's needs to grow. Nutrition gardens introduce students to the origins of food and healthy eating habits. Schools use gardens as tools for teaching science, math, and even language arts (Ozer, 2007). For instance, students can conduct an experiment to compare the growth rates of crops with and without compost. The activity can reinforce their understanding of both scientific and mathematical concepts if the experiment also requires students to create graphs to analyze their findings. Whether schools incorporate a heritage or nutrition garden, the garden serves as a resource for cultivating academic skills and a connection with nature.

2.5.2 Design of Outdoor Spaces

Schools are also redesigning their outdoor spaces. For example, as an extreme case, Fuji Kindergarten in Tokyo, Japan (seen in Figure 1) made its entire school an outdoor space (Tezuka, 2015). In the context of educational environments, an outdoor space is an area outside of an indoor classroom that is structured to support recreational and educational activities. While many schools implement an outdoor area as a playground, they encompass other types of outdoor areas, such as outdoor classrooms, schoolyards, and nature trails. Even though outdoor areas vary among schools in their construction, features, and use, they share the common goal of providing a planned environment that nurtures a connection with the natural world.



Figure 1: Fuji Kindergarten in Tokyo, Japan, an example of an outdoor school space

Although research on the benefits of specific outdoor designs is limited, research has shown the importance of outdoor play for children (see section 2.3 of the report). Through outdoor play, children improve across various domains, including environmental literacy, cognition, social-emotional well-being, physical health, and language and literacy. A well-planned outdoor environment can provide the same benefits as outdoor play.

An effective outdoor space contains the following eight elements (Nelson, 2015):

- I. Maximizes the time doors are left open so that children can move in and out freely.
- II. Increases time spent during the school day to about 50%.
- III. Transfers control of activities to children.
- IV. Encourages children's independence and initiative by making various supplies actively available.
- V. Have an engaged instructor who knows when and when not to interfere with the children.
- VI. Specifies the learning goals children should be achieving.

- VII. Designates areas for each outdoor activity and organizes outdoor space for different activities to occur alongside one another.
- VIII. Supports child-created activities by providing a foundation for each activity and asking thought-provoking questions.

This set of criteria can be used by educators to evaluate the current state of their outdoor program and identify areas in need of improvement (Nelson, 2015). While a universal outdoor design does not exist, many effective outdoor spaces share the common characteristics outlined in the above criteria.

Outdoor environment best practices may also involve incorporating different types of play zones, learning centers, and transition areas (Wilson, 2008). Play zones may include nature, adventure, active play, quiet play, and quiet retreat zones. Each zone should provide the necessary materials and structures that cater to early childhood development needs, such as problem-solving, socializing, and creative play. For example, an adventure zone can cater to a child's need for physical activity by including trees to climb up, swings to fly on, and tires to navigate over.

Learning centers focus on a particular type of activity. An example learning center activity is dramatic play. The significance of dramatic play lies in its ability to invite creativity, foster social interaction, and contribute to the holistic development of children. It also fosters an understanding of self and others and evokes critical development and learning skills – including the ability to work cooperatively, to negotiate, share, discuss, anticipate, and conclude (Bilton, 2002). While indoor dramatic play areas are essential, outdoor settings provide a much broader scope for movement and allow play on a larger scale, engaging the whole child. This larger scale ensures versatility and allows children the freedom to explore and move props within specified

areas, promoting imaginative play (Wilson, 2008). Figure 2 is a guide with recommendations to include in a dramatic play area (source: Wilson, 2008).

An outdoor dramatic play area can be found at Turn Back Time in Paxton, Massachusetts. At this location, the IQP team observed a stage with props and costumes in their outdoor environment. These dramatic elements included utilizing natural materials, animal costumes, and props for children to role-play (see Figure 3).

- | | |
|-----------------------------|---|
| Dramatic Play Center | Platform or other specified area |
| | Places to sit (logs, stumps, benches, blanket, etc.) |
| | Materials/props to motivate role playing: |
| | <ul style="list-style-type: none">• dress-up clothes• dolls• stuffed animals• large appliance boxes• dishes and other household items• yard and gardening supplies (wheelbarrows, rakes, etc.)• camping equipment• back packs. |

Figure 2: Guide for building a dramatic play center (Source: Wilson, 2008)



Figure 3: Dramatic Play Area at Turn Back Time in Paxton, MA

Recent literature has also emphasized the naturalization of outdoor areas, the process of integrating more natural elements into a human-made environment (Constable, 2012; Stevenson, 2020; White & Stoecklin, 2014). Common approaches include the removal of non-natural surfaces, such as asphalt and plastic turf, for natural elements, like dirt and grass; the planting of native plant species; and the establishment of pollinator gardens. While the approaches are focused on promoting nature interactions, they also support the surrounding ecosystems. For example, planting native plant species provides a habitat for native animals. By naturalizing planned environments, outdoor spaces can serve both children and their surrounding environments. Students are found to prefer more natural areas that encourage exploration and creativity, providing a more direct and experiential connection with nature compared to abstract settings. The use of rustic building materials like rough-hewn logs or boulders creates an informal, nature-oriented atmosphere in outdoor learning spaces. Additionally, sculptural materials such as cob (a mixture of clay, straw, and sand) and "earthbag benches" filled with sand or soil offer students the opportunity to shape their environment creatively. For instance, a

simple bench can be sculpted into a fairytale dragon, a school mascot, or a familiar animal, transforming ordinary schoolyard spaces into memorable places (Danks, 2010).

Moreover, the inclusion of natural and reclaimed materials on school grounds communicates a commitment to environmental stewardship. These materials serve as teaching tools for lessons on ecological responsibility and time-tested construction techniques. The use of natural and reclaimed building materials also provides opportunities for artistic expression, introducing a variety of textures and tactile experiences that enrich the environment for students accustomed to metal and plastics. These materials often display age-related patinas, unique wood grain patterns, or growth rings, adding depth, variety, history, and intrigue to the schoolyard. For children in urban areas, this exposure can be revelatory, offering a tangible connection to nature amidst their daily routine (Danks, 2010).

Another critical aspect of an outdoor environment is manipulation and transformation. Both adults and children should be able to rearrange and reconstruct different aspects of the environment. This transformability and flexibility fosters creativity and encourages problem solving. A way to integrate transformability into the outdoor space is by implementing loose parts. Loose parts are materials that children can manipulate and move about on their own. They can range from simple natural materials, such as pieces of bark, small stones, leaves, sticks and seeds, to actual construction materials such as pieces of lumber, wire or plastic mesh, and strips of leather or “fat ropes” (Wilson, 2008). Turn Back Time in Paxton, MA also shares this view of a transformable environment, integrating loose parts play into their outdoor environment in the form of sticks, branches, tires, etc.

A critical aspect of designing an outdoor area is the active involvement of children. Children need play spaces that are designed with their needs and interests in mind. In planning an outdoor play space, children's ideas should be solicited and taken seriously (Wilson, 2008).

Additionally, engaging parents in the design process can not only increase their involvement but also enhance their enthusiasm and understanding of the benefits of nature.

2.5.3 Indoor Integration of Nature

When implementing a nature education, many people have the impression the classroom needs to be taken outdoors; however, taking nature into the indoor learning environment is also key aspect of implementing a nature program. Taking nature into the indoor learning environment means infusing natural elements into the classroom to reflect the outdoor surroundings of where the school is located. By adding natural elements to the classroom, children have more opportunities to interact with nature (Larimore, 2018).

A key practice involved in integrating nature into the indoor environment is to “connect the indoors to the outdoors” (Larimore, 2018, 37). In other words, creating a transition between the indoor and outdoor space is important for integrating nature indoors. Many schools have created the transition by building low windows with views to the outside world, adding bird feeders outside the windows, and establishing small indoor gardens with pots, vases, and watering cans (Larimore, 2018; Farizah Saleh et al., 2018). By blurring the boundaries between the indoor and outdoor environment, children develop a sense of continuity and connection between the two settings.

The infusion of natural elements into classrooms also offers an opportunity to incorporate learning materials related to nature, especially in Montessori environments, where learning

materials are sensorial and made readily available for students engagement. The Montessori materials can be objects of nature, such as pinecones, rocks, and leaves. A Montessori school in France added a discovery tray with pinecones, twigs, and flowers, for children to feel and inspect (Bidell, 2017). To encourage students to further inspect the materials. the school included a magnifying glass on the tray. The same school also redesigned their existing Montessori materials, such as their memory cards, to feature natural objects, like branches, nuts, and vegetables. By incorporating learning materials related to nature, schools can nurture the development of children through sensory experiences while promoting their interactions with nature.

2.5.4 Parental Involvement

While many may view children and instructors as the primary actors involved in integrating a nature education, parents play an equally pivotal role. Numerous studies state that educating parents about nature education is an important aspect of integrating a nature program (Bidell, 2017; Williams, 2008; Bohling et al., 2015). The education of parents is important because their understanding shapes their attitudes, level of support, and concerns about the program, which in turn may influence how educators can implement a nature-based curriculum. Because parents tend to be concerned about safety and cleanliness (Marti, 2021; Yilmaz, 2016), instructors may be limited in the activities and experiences they can provide children. By having the recognition and support of parents, instructors have more leeway to design and deliver a robust nature-based curriculum.

Teachers need to educate parents about the significance of nature education because they are the ones who are interacting with the children. To address concerns about cleanliness and safety, teachers can have a weather policy in place, provide outerwear for particular outdoor

activities and excursions, and cultivate a common positive attitude toward playing outdoors even during inclement weather (Bidell, 2017; Bohling et al. 2012). Teachers can also give parents opportunities to directly observe their children in nature (Bohling et al. 2012). Positive parental observation on children's interactions and how well they learn can strengthen their opinion on outdoor and nature activities.

To give parents opportunities to observe their children in nature, teachers can provide volunteer opportunities. Recent literature highlights a trend where parents engage in nature programs by volunteering for school gardens (Alexander et al., 1995; Ozer, 2007). By having parents volunteer, schools can strengthen the bond between parents, educators, and students through shared experiences while offering parents firsthand insights into the benefits of a nature education.

These various observations and findings from the literature and background set the stage for further analysis and comparison of practices and concerns for Yi Mi. To aid in evaluating the situation at Yi Mi, we now provide insight into the methodology to gather and analyze data associated with this project.

3.0 The Methodology

The goal of the project is to assess the effectiveness of Yi Mi's nature program in fostering the development and well-being of children. Through the assessment, the project aims to validate the effectiveness of Yi Mi's program, provide recommendations to improve it, or both. To achieve the goal of the project, the research questions or objectives of this study are to (1) determine to what extent parent and instructor perspectives align with the benefits of nature-based approaches and (2) to understand what research-backed nature-based approaches can be

applied to enhance Yi Mi's program. Recommendations for Yi Mi's program will be made (objective 2) after identifying areas for improvement (objective 1).

The surveys and interviews that were conducted are central to primary data collection. The two target sample populations are parents who have children enrolled in the nature program and instructors who participate in the nature program. Parent data was collected through questionnaires, while instructor data was collected through interviews.

Survey questionnaires allow for data collection from a larger sample of the parent population. In contrast, interviews will allow an in-depth understanding of instructor observations, experiences, and opinions.

In addition to surveys and interviews, a third source of primary data, observational benchmarking, serves as a method to establish benchmarks that can further inform the evaluation process. The combination of these primary data sources ensures a comprehensive and multi-faceted approach to assess the impact and effectiveness of Yi Mi's nature program. The assessment will be used to make informed recommendations and conclusions to Yi Mi regarding its nature program.

3.1 Parental Surveys

For the first research method, an online survey was completed through a digital survey platform called Wenjuanxing. The target population for the surveys is parents who have children involved in Yi Mi's nature program. The survey contained 12 questions concerning parents and their children, the perceived benefits of Yi Mi's nature program, and parental satisfaction. Research regarding the benefits and effective implementations of nature-based programs from Section 2 is used to inform the survey questions.

The survey questions primarily consist of multiple choice and Likert-type scale questions to make the survey quick for parents to complete and ensure a consistent data set (Nemoto & Beglar, 2014). Several open-ended questions are included for parents to elaborate on their answers. The data collected through the survey was quantitative, with limited qualitative information from the open-ended questions. The questionnaire is found in Appendix A.

The survey is in Mandarin Chinese. We initially created surveys in English and sent them to our Hangzhou Dianzi University (HDU) counterpart to translate the questions into Mandarin. The Yi Mi sponsor liaison, Ms. Kathy Wei, reached out to parents and distributed the surveys on our behalf. The surveys were distributed on WeChat using a QR code. With the QR code, parents were given a short set of instructions for completing the survey and a reminder that their participation is voluntary and confidential. We completed a descriptive statistical analysis using the Excel software package on the survey data. This process includes organizing the data into charts, such as frequency tables, bar graphs, and pie charts, to draw conclusions about parent perspectives.

3.2 Interviews with Instructors

For the second research method, in-person interviews are conducted. The target population for interviews were instructors who were involved in Yi Mi's nature program—including nature and non-nature instructors. We conducted a total of 8 interviews, of which 4 interviews were with instructors from the nature program and the other 4 were regular Yi Mi instructors who observe students from the nature classes. The interviews were conducted using a semi-structured format. Semi-structured interviews generally follow a guide designed prior to the interview, but leave room for expansion in the conversation as the interview progresses (Magaldi

& Berler, 2020). The complete set of interview questions for the interviewees appears in Appendix B.

Instructor interviews focused on understanding their opinion about Yi Mi's program and whether nature approaches from different countries can be applied to Yi Mi. Research regarding the benefits and effective implementations of nature-based programs from Section 2 was used to inform the set of interview questions. The data collected from the interviews were qualitative and rich with narrative responses.

Similar to our procedure for distributing surveys, we leveraged our connection with the sponsor liaison, Ms. Wei, who agreed to identify and recruit instructors. Before conducting each interview, Ms. Wei reached out to the interviewee through WeChat to explain the purpose of the study, assure them of confidentiality, and schedule a time and place. Members from our Hangzhou Dianzi University (HDU) team counterpart conducted the interviews at the Yuhang campus in Hangzhou. For each interview, an HDU member was the interviewer and two HDU members were taking notes. A Worcester Polytechnic Institute (WPI) student was also present to observe the collection of data. Each interview was audio recorded after the interviewee provided verbal consent to record. Each interview was transcribed into Mandarin. Afterwards, each transcript was translated into English by both the HDU and WPI teams to crosscheck the accuracy of the translation.

Each transcript was annotated, coded, and analyzed for recurring themes. The coding process involved three key subsections—design, implementation, and outcomes. Design focused on the general curriculum layout, including outdoor area design, training, and limitations. Implementation focused on the application of design, through teaching and student engagement. Outcomes centered on the results of the program, child and parent response, and teacher feedback. Each member of the WPI team coded two interviews, in addition to checking the

coding results of two others to minimize personal bias and arrive at general agreement on the content interpretation.

3.3 Observational Benchmarking

Observational benchmarking primary data collection involved visits to two schools to inform and enhance Yi Mi's nature program. Our initial visit was to T.E.C Schools in Worcester, Massachusetts, with a focus on comprehending Montessori education principles. Through a detailed tour, we observed the effective integration of Montessori principles into classroom practices, aiming to establish a foundational understanding before our visit to Yi Mi in China. The second school visited was Turn Back Time, a nature-based preschool in Paxton, Massachusetts. Our observation concentrated on how children establish meaningful connections with nature in an educational setting. Through observation of their outdoor area and nature program, we gained valuable insights into the practical application of nature-based approaches in early childhood education. These benchmarking visits contribute directly to our assessment and offer potential recommendations for Yi Mi's nature program.

3.4 Methodology Limitations

In any research process, limitations can influence the reliability of research findings. The following section serves to provide an evaluation of the methodological limitations that we expect to encounter during the study. While we took many measures to mitigate the limitations, it is likely a number remain, we summarize some potential limits to this research.

Collecting observations from parents and instructors to assess the effectiveness of Yi Mi's program in fostering the development and well-being of children has limitations. While our approach allows us to adhere to WPI's Institutional Review Board policies and guidelines, the

observations are indirect measurements of the children's development. Although parents and instructors provided observations based on their perceptions, their insights may have been shaped by their beliefs, desires, and experiences. Because we assessed the children's development through the observations of parents and instructors, our childhood programmatic conclusions are indirect.

Besides being unable to collect direct observations of children's development, potential for recall bias is present. When we asked parents and instructors to recall their observations, their recollections might have been influenced by their personal experiences. For example, parents with more fond memories of spending time outdoors during their childhood may have recalled more positive outcomes when reflecting on their child's participation in the nature program. If parents recalled more positive outcomes in their children's development, it may result in a situation where the program seems more effective than it is.

Finally, the language barrier between our subjects, i.e., the parents and instructors, and the WPI IQP team throughout our primary data gathering process affects the reliability of results. Although members of our HDU team counterpart served as translators for us, the quality of the responses received are influenced by the translator's understanding, level of cultural awareness, and fluency in English. As a measure, another HDU member cross-checked the translation before the data was evaluated, in addition to WPI conducting our own translations through software available from the United States.

Acknowledging limitations is imperative to those who rely on our results. Our methodology limitations include the indirect nature of the observations, the potential recall bias in participants' recollections, and the language barrier between the participants and researchers. To ensure the integrity of the study's results, we took measures to mitigate the effects of the limitations. By acknowledging and addressing the limitations, we aim to provide Yi Mi with an

accurate evaluation of their program in fostering the development and well-being of their students.

4.0 Findings

Section 4 assesses the findings and results analysis from the data collection methods detailed in the methodology section (see Section 3). The analysis will also rely on background research (see Section 2). As discussed in the previous section, the goals of study are to understand parental and instructor perspectives on the benefits of Yi Mi's nature-based approach. These findings and analyses will inform recommendations that can be given to Yi Mi. The subsequent findings reveal insights regarding student development outcomes (see Section 4.1), parental satisfaction and student enjoyment (see Section 4.2), parental concerns (see Section 4.3), parental awareness about nature education (see Section 4.4), and the differences and similarities between Yi Mi's nature curriculum and Western curriculums (see Section 4.5).

4.1 Student Developmental Outcomes

Survey and interview data from the observations of both parents and instructors were the first primary data used to evaluate student outcomes. The key finding from this data is that Yi Mi's nature program has proven to be effective in nurturing the development and well-being of Yi Mi students.

The parental survey focused on their observations of early development outcomes. Parents were asked to assess the degree to which they noticed improvements in various developmental traits in their children after enrolling them in the program. These traits align with the five domains outlined in section 2.3: environmental literacy, cognitive development, social-

emotional development, physical development, and language and literacy. There were 59 responses from a total of 128 parents asked.

The student development dimension results appear in Table 1. A set of questions was worded as “Please rate the extent to which you agree with the following statements after enrolling your children into Yi Mi’s nature-based program”. Mean values of the parent responses regarding observed improvements for each developmental trait appear in the second column of Table 1. Notably, the mean agreement scores for each trait exceeded a value of 4 (‘Agree’), indicating a positive observation by parents in student development across all traits. Additionally, the standard deviation values suggest a high degree of agreement among respondents, as responses were closely clustered.

The highest average response rating (4.54) occurred for the *knowledge about the natural world* child developmental trait. This development trait also had the lowest standard deviation (0.62), with the greatest agreement amongst the parent respondents. Tests comparing data on *knowledge about the natural world* with other traits confirmed a statistically significantly higher average, emphasizing the unique impact of the nature program on this specific developmental aspect. For example, when compared to *Positive Interactions with Others*, the next closest mean, a test revealed a p-value of 0.015, indicating a significant difference in means at a significance level of 0.05 between these two traits—each of the other differences are more significant.

Table 1: Results of Child Developmental Trait* improvements as observed by Parents.

Development Trait Question	Mean	Standard Deviation
My children’s physical agility has improved.	4.10	0.88
My children’s coordination has improved.	4.15	0.89
My children have more positive interactions with other children.	4.31	0.79
My children engage in more cooperative play with other children.	4.31	0.79
My children’s ability to problem solve has improved.	4.27	0.81
My children’s creativity has improved.	4.20	0.83
My children’s attention span has improved.	4.22	0.81
My children’s motor skills have improved.	4.20	0.89
My children’s stress and anxiety levels have improved.	4.14	0.88
My children’s knowledge about the natural world has improved.	4.54	0.62

(*Question: “Please rate the extent to which you agree with the following statements after enrolling your children into Yi Mi’s nature-based program.” 1- Strongly Disagree- 5 Strongly Agree).

Interview data with instructors further supports the parent survey perceptions on student development trait improvements. The interview data show that nature education significantly contributes to children's independence, self-confidence, and creativity.

Nature Instructor 2 provides a vivid example from the "Wilderness Hunter" course, where children engaged in survival scenarios, demonstrating problem-solving skills and creative thinking, such as using nearby tree stumps for fire. This creativity is further highlighted by the same instructor's insights into conducting outdoor music classes, where posing questions to children stimulates their strong creative abilities and includes their input into the program.

Nature Instructor 2 further elaborates on their observations of student development in the nature program:

“Firstly, for those who have participated in nature education for an extended period, it significantly enhances the child's independence. Secondly, it cultivates a child's self-confidence. In nature activities, such as our forest classes, when a child uses tools independently, the immediate joy is immense. Children and even adults might be surprised that such a small child can use tools effectively. The child not only uses tools but also creates with them, boosting their confidence. Lastly, it enhances their creativity. Current Chinese children often lack creativity. Nature education can help in this regard

by promoting creativity and breaking away from the rigid structure of traditional education, which is primarily exam oriented.”

As the instructor notes, traditional Chinese education is exam-oriented, having many flaws and leaving little room for creativity, but many restraints from society ensures its continuation in China (Meng et al, 2021).

Other instructors also observed improved student development from the nature program. Regular Montessori Instructor 2 emphasizes the sensory benefits of courses related to food, engaging all five senses, and contributing to overall sensory development. This instructor further elaborates on how being outdoors through the nature program is beneficial to children’s physical and mental health:

“One aspect is the natural health of children. Exposure to natural sunlight is beneficial since many children now have poor eyesight. Being in nature is physically healthier for them. Another aspect is psychological—being in nature provides a limitless outdoor space. When humans connect with nature, it releases substances similar to dopamine. This can enhance mood. When a person is depressed, being in nature can bring a sense of pleasure. So, from a physical perspective, being outdoors and exposed to more healthy sunlight is beneficial. From a psychological perspective, we can experience more pleasant emotions. This psychological health is achieved through interaction.”

Nature Instructor 4 stresses the adaptability of the curriculum, for example, for motor skills development, they...

“can tailor the curriculum content based on the individual hand development of each child. For some, we may encourage them to practice cutting, while for others, we may provide pre-cut materials, adjusting the curriculum according to their diverse developmental stages.”

This adaptability ensures a supportive learning environment for diverse developmental stages.

Regular Montessori Instructor 4 underscores the broader impact of nature activities, as:

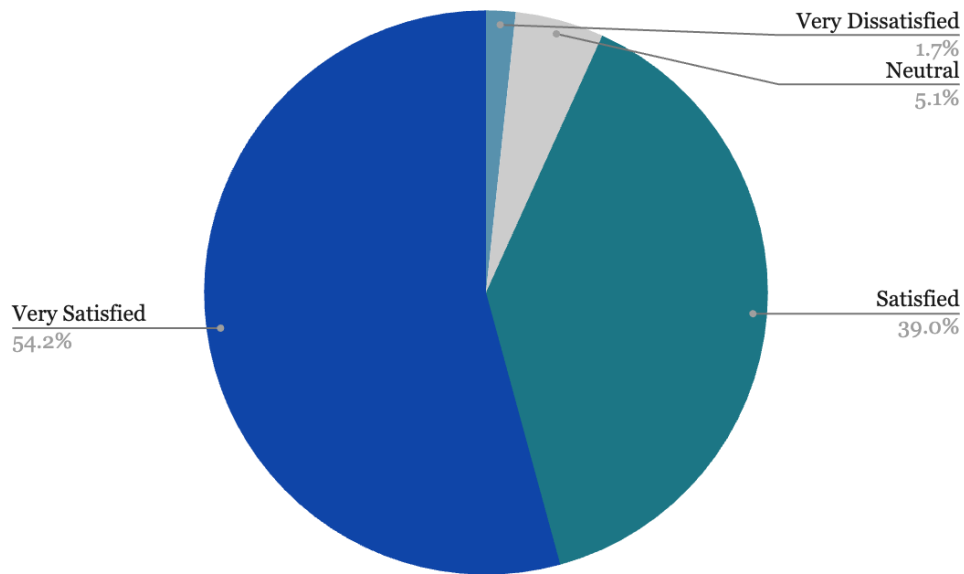
“engaging in these activities helps improve parent-child relationships, and children can socialize with their peers. The activities contribute to their sensory development, exploration and understanding of nature, and the development of critical thinking and problem-solving skills”.

In conclusion, our data from surveys and interviews confirms that Yi Mi's nature program effectively nurtures children's development traits as defined by the student development literature and those that meet Montessori goals.

4.2 Parental Satisfaction and Student Enjoyment

Parents demonstrated a strong level of agreement on the effectiveness of Yi Mi's nature program, as discussed in detail in Section 4.1. When asked more directly about their personal satisfaction with the program, parents reaffirmed these strong results. As shown by Figure 4, most parents indicated satisfaction with the program, with over half of them indicating that they were very satisfied.

Figure 4: Parent Satisfaction with Nature Program. *



(*Question: " Which of the following best describes your level of satisfaction with Yi Mi's Nature Education Program?")

Instructor interviews yielded similar responses as parental opinions. Regular Montessori Instructor 3 believed parents liked the program and noted that both the parents and children enjoyed the once-a-month off campus class, describing that “it provides them with a rare opportunity to experience nature”. The instructor also highlighted a particular activity where children gathered and cooked mushrooms, and the activity received praise from parents in their WeChat group for the enjoyment it brought to their children. Regular Montessori Instructor 4 furthered this point by indicating high levels of student engagement and enjoyment across the nature program:

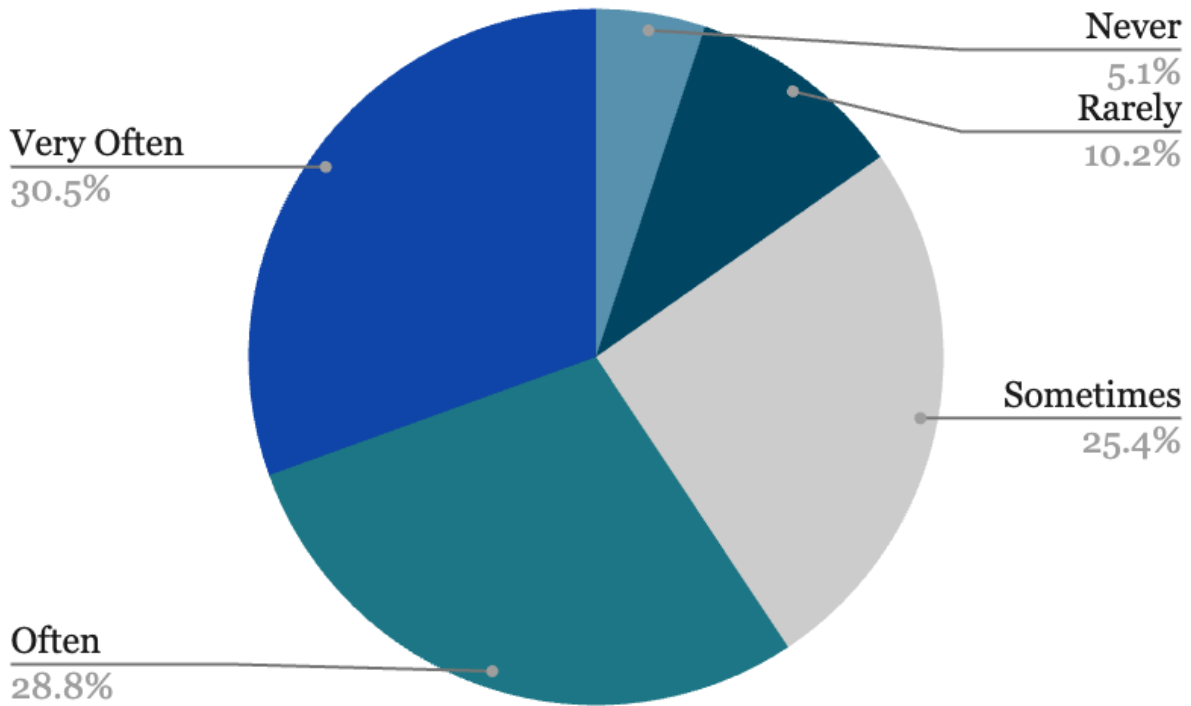
“I feel they are all quite engaged. The classes usually start with teaching some knowledge and then move outdoors to explore. For instance, we talked about moss, a plant they see every day but may not recognize. After learning about it, when we took them outside later, they could identify moss. It feels like they suddenly have enriched knowledge.”

Other instructors primarily discussed student enjoyment. Regular Montessori Instructor 1 described from their personal observation that the children thoroughly enjoy every nature class and looked forward to the days they get to spend outside. They also mentioned how during nature activity days, the children often wake up early to urge their parents to set out earlier in the morning.

Nature Instructor 2 detailed children's growing creativity and desire for experimentation and exploration during these activities. A study conducted by Pike et al. (2011) investigated the relationship between student engagement and learning outcomes. They found that, "the findings of this study unequivocally demonstrate that student engagement is positively related to student learning" (Pike et al., 2011, pp 568). With this finding in mind, we can draw the conclusion that since Yi Mi's students are enthusiastic about the nature program, it leads to the formation of positive learning outcomes.

We also asked parents how often their children recount experiences from the nature program. As seen in Figure 5, most parents said their children recounted their experiences, many responding *often or very often*. Considering the widespread conclusion that children are enjoying the program, the experiences they are recounting are most likely positive. Therefore, not only do the children relish this program and learn, but it also forms positive memories for them.

Figure 5: Child Recounting of Nature Classes. *



(*Question: " How often does your child tell you about their experiences and activities in nature class?")

4.3 Parental Involvement

The study and project investigated potential reasons for parental concerns about their child’s involvement in Yi Mi’s nature program. Survey results show parents had few concerns about the safety, cleanliness or practicality of Yi Mi’s program. Parents were asked “Are there any reasons you might not want your children to engage in nature classes?” as summarized in Table 2, most parents noted that there were no concerns they had that would cause them to hesitate to enroll their children in Yi Mi’s nature program. However, instructor interviews showed that instructors felt restricted due to mitigating parental concerns in their programming.

Table 2: Parental Concerns with Nature Classes.

Reason	Percent Checked "Yes"
No reasons	83.05
Practicality of the nature class	1.69
Safety issues of the nature class	6.78
Hygiene issues of the nature class	3.39
Nature class will exhaust your child	0
Other reasons	15.25

(Question: " Is there any reason why you would not want your child to participate in a nature class?")

Yi Mi instructors did not indicate the same level of support and low level of concern during interviews. Yi Mi instructors described a lack of parental support, a desire for more parental involvement, and some parental concerns. This discrepancy between the parental responses and the instructor interviews supports the idea that Yi Mi is effectively mitigating parental concerns. This mitigation of concerns may come at a significant constraint on the instructors and their ability to teach the nature program.

Instructors expressed that parents had major concerns with the overall safety of the program. They described safety as “the biggest obstacle to forest education in [China]” and these concerns particularly emerged during specific activities like “making fires and woodworking”. This struggle is not unique to China, but societal beliefs about the role of education further limit acceptance of outdoor education concepts (Meng et al, 2021).

Outdoor play is designed to challenge children with experiences that test their developmental skills, require them to take risks and overall tap into both children and adults’ feelings of uncertainty (Herzog, 2020). Early childhood education centers both utilize and define this concept as “risky play”, in which children encounter high heights and speeds, dangerous tools and rough activity (Sandseter, 2020). Any risk or involvement in risky play is a parental concern that limits children’s ability to fully and freely utilize outdoor play—these limitations curtail instructor and programmatic offerings (McFarland, 2014).

One instructor stated that safety concerns lead to the “overprotectiveness” of children. This overprotection can reduce children's awareness of safety in outdoor environments, which can potentially lead to them panicking and feeling insecure when in these environments. This instructor described that children possess “boundless potential and adaptability”, but self-imposed limitations hinder their growth and development (McFarland, 2014).

Other main concerns that arose in the interviews regarded cleanliness and practicality. Some parents worry about their child’s cleanliness in outdoor settings, which is picked up and reiterated by their child. Other schools have faced issues delivering natural education when parents do not support messiness in childhood nature education (Dankiw et al, 2023). One instructor spoke of how this hygiene apprehension is an issue more related to parenting itself, but this fear of dirt and bacteria, and an emphasis on appearance hinders the children's ability to fully appreciate and connect with nature.

Instructors expressed difficulties educating and engaging parents with information about the nature program, and thus parents lack basic understanding of the philosophies and benefits of the program. Instructors expressed a need for increased awareness regarding the connection with nature and childhood development, especially in a way that does not take away from any of the school’s attention and resources.

4.4 Comparison with Western Curriculums

Yi Mi and comparable programs in our background research both describe the core missions of their nature-education programs as connecting children to nature, instilling a sense of environmental stewardship, and utilizing nature to develop children’s scholastic abilities. Despite these common goals, many programs in the West (Europe and North America, primarily) also

embrace goals like embracing a personal sense of responsibility and caring, as well as physical health and development, as outlined by the North American Association for Environmental Education (Simons et al., 2016). Yi Mi, however, focuses on an innovative and excitement-driven stance that fosters children's curiosity through nature. This focus allows them to market themselves as innovative in a country with primarily conservative views on and approaches to education (Liu, 2014).

Both Yi Mi and Turn Back Time, from Paxton, MA—based on primary observational data to a site visit to Turn Back Time—integrate nature into their curriculum. But each has a different approach for selecting lesson themes. Turn Back Time has a spontaneous approach which involves selecting themes based on the children's current interests, creating an organic and engaging learning environment. Yi Mi adopts a more methodical approach, structuring lessons around the 24 Chinese seasons. This schedule increases the program's predictability, caters to parents' expectations and aligns with a culture that values organized learning experiences. It also allows for better planning of activities in anticipation of the seasonal characteristics.

Yi Mi's learning objectives emphasize the progression from action to language, social contact, intelligence, and cognition, suggesting an interconnected approach to the education provided by their nature program. In our research, we reviewed Turn Back Time's curriculum plan, which listed more clearly defined learning objectives such as literature, science, math, fine motor skills, reflection, gross motor skills, art, and social-emotional development. Yi Mi's objectives, while touching on similar areas, are more broadly written and may benefit from more specific language.

The activities listed in Yi Mi's activity booklet align with worldwide schools that excel in hands-on, outdoor activities that accomplish common nature-education goals. Yi Mi's emphasis on activities that require traveling broadens the scope of experiential learning they can provide,

removing the limitations of their city-based campus. Yi Mi does not only provide an outdoor education utilizing their own space, but rather incorporates trips to the nearby Xixi National Wetland Park. Yi Mi's curriculum plan outlines various activities that take place in this National Park, many of which would not be possible to conduct on their campus.

Yi Mi distinguishes itself with a comprehensive curriculum plan that incorporates the overarching goals and themes of the program, a class timeline and a meticulous activity guide. Yi Mi's commitment to the program is shown through their careful planning and research and outlined staff qualifications and training. This plan also provides a valuable resource for parents to both support their child's education and understand Yi Mi's mission.

5.0 Conclusions and Recommendations

Section 5 details recommendations for Yi Mi to consider, challenges faced by the WPI team during the project, and the conclusion.

5.1 Recommendations

Section 5 presents recommendations for Yi Mi to consider for improving their nature program. The data analysis in Section 4.0 validated the efficacy of Yi Mi's nature program in nurturing the development and well-being of children, thus, the recommendations presented in this section seek to provide suggestions for continuous improvement.

The subsequent recommendations revolve around three categories: curriculum design (see Section 5.1.1), outdoor space (see Section 5.1.2), and organizational support (see Section 5.1.3). The recommendations presented are supported by the research presented in the

background section (see Section 2), observational benchmarking with visited locations (see section 3.3), and the findings from the instructor interviews (see Section 4.0).

5.1.1 Further Nature Program Integration into the Montessori Curriculum

During interviews, many instructors shared interest in integrating the nature program into the Montessori program at Yi Mi. The instructors felt as though Yi Mi treated the two as separate programs. The instructor opinions are supported by the existence of Yi Mi's dedicated department for the nature program and the weekly Friday classes that are used solely for nature activities. By providing a distinct department and day for the nature program, Yi Mi presents a boundary between the two programs.

To address the instructor's interest in integrating the nature and Montessori programs, Yi Mi can consider incorporating Montessori elements centered around nature in the classroom. The idea of incorporating Montessori materials related to nature was discussed in the background section (see Section 2.5.2) as a means of establishing a transition between indoor and outdoor spaces; however, it can also be used as a means for blending the Montessori and nature program together.

As for the type of materials Yi Mi can add, Yi Mi can draw inspiration from successful practices (see Section 2.5.3), such as the discovery tray with natural objects from a Montessori school in France (see Figure 6) and the memory cards with natural objects (see Figure 7). Adding Montessori materials centered around nature unifies the nature and Montessori program by providing children daily interactions with the natural world while offering Montessori instructors the opportunity to facilitate these nature experiences.



Figure 6: A tray with objects of nature, such as pinecones, rocks, and leaves, used to facilitate sensorial experiences in a French Montessori School.



Figure 7: Memory cards featuring natural objects, such as pinecones, leaves, and nuts, from a French Montessori School.

5.1.2 Modify the Outdoor Area Layout

As discussed in Sections 2.3 and 2.5, a well-planned outdoor area can benefit children across numerous developmental domains, such as environmental literacy, physical health, and cognition. Yi Mi's outdoor area extends in multiple directions from the school building which is situated at the center of Yi Mi's property. At the forefront of Yi Mi's outdoor area is an open space equipped with a playground and various play equipment, such as bikes, tires, and climbing nets (see Figure 8). At the rear of Yi Mi's outdoor area is the school garden adorned with trees, stones, and wooden posts (see Figure 9). Although Yi Mi has provided an outdoor space for children to play and learn, Yi Mi can unlock further benefits for children by considering improvements to their outdoor area layout.



Figure 8: The forefront of Yi Mi's outdoor area, consisting of a playground and various play equipment.



Figure 9: The rear of Yi Mi's outdoor area, consisting of a garden adorned with trees, stones, and wooden posts.

Yi Mi has incorporated natural elements into their outdoor area, but opportunities for further naturalization exist. Drawing on the research findings regarding the design of outdoor spaces from Section 2.5.2, Yi Mi can add more challenging terrain to their outdoor environment, including steppingstones, mounds of earth, and tree stumps (Constable, 2012; Stevenson, 2020; White & Stoecklin, 2014). Because Yi Mi currently only features caged animals, like rabbits and chickens, on the edge of the school garden (see Figure 10), they can also consider introducing a wider array of wildlife, specifically uncaged animals, like birds, bugs, and fishes, to teach children how to respect and care for living things. To introduce more wildlife, Yi Mi can create an inviting environment through the use of elements that entice creatures into the space, such as bird feeders, native plants, and nesting boxes.



Figure 10: The corner of Yi Mi's school garden, where caged rabbits are dwelling.

Besides modifying the terrain and introducing natural wildlife, Yi Mi can further enhance its outdoor area by utilizing natural materials for surfaces within the outdoor area as described in Section 2.5.2 (Constable, 2012; Stevenson, 2020; White & Stoecklin, 2014). The artificial flooring in spaces, like the turf area in front of Yi Mi, can be substituted with lush, well-manicured grass adorned with wildflowers, native plants, and natural seating elements. An example of a simple, natural seating element be seen in the outdoor classroom at Boston University's Children's Center, where logs are arranged in a circular formation to encourage children to gather and interact (see Figure 11). Similarly, in an outdoor classroom in El Cerrito, California, straw bales, also arranged in a circular formation, serve both as seating elements and work surfaces (see Figure 12). By adopting a naturalized approach to Yi Mi's outdoor area, Yi Mi can demonstrate a more creative blend of functionality and natural aesthetics.



Figure 11: Circular arrangement of logs used as seating at Boston University's Children Center.



Figure 12: Circular arrangement of straw bales used as seating and work surfaces at Golestan School in El Cerrito, California.

Adding a dramatic play area is also another modification Yi Mi may want to consider. A dramatic play area is a zone that encourages children to engage in imaginary play by taking on various roles and acting them out. Yi Mi can draw inspiration from Turn Back Time, a forest school in Paxton, MA. Turn Back Time created a stage using natural materials and stocked the stage with props and costumes of animals from their outdoor environment (see Figure 13). Expanding on Turn Back Time’s concept, Yi Mi can consider further stocking the area with stuffed animals, dress-up clothes, and household items as described in Section 2.5.2. By further enhancing Yi Mi’s outdoor area, Yi Mi’s children stand to maximize the benefits associated with outdoor play.



Figure 13: A stage completed with props and costumes to encourage dramatic play at Turn Back Time in Paxton, MA.

5.1.3 Enhance Parental Awareness and Understanding for Nature Education

In instructor interviews, many instructors expressed that the absence of parental support impeded the development of Yi Mi's nature program. According to instructors, parents demonstrated a lack of understanding of the role nature plays in fostering children's early development and instilling eco-centric attitudes (see Section 4.3). Parents also conveyed doubts about the nature program by citing concerns regarding safety and cleanliness. Because nature education often involves risk-taking and messy play, the absence of parental understanding of nature education and concerns about cleanliness and safety are interconnected as a parental involvement issue. The issue of parental involvement may serve as a barrier to growing Yi Mi's nature program by limiting the activities and experiences Yi Mi can provide.

To enhance parental involvement, Yi Mi can explore the option of providing volunteering opportunities for parents. The concept of providing volunteering opportunities to parents was presented in the background section (see Section 2.5.4) as a strategy for developing parental comprehension and positive attitudes toward nature education (Alexander et al., 1995; Ozer, 2007). Volunteering may improve parental support and understanding of nature education because parents can see how happy their children are outside and how much they are learning. By bolstering parental involvement, Yi Mi can tackle the challenges involved with both the lack of parental understanding of nature education and concerns regarding safety and cleanliness.

To extend upon the recommendation of providing volunteering opportunities to parents, if Yi Mi considers modifying the outdoor area (as presented in Section 5.2.2), involving parents as volunteers in the process can be a valuable strategy. Involving parent volunteers would be a valuable strategy because parents would be able to provide insights into their children's needs and preferences. Yi Mi would also stand to benefit from both increased parental support and an improved outdoor space.

5.2 Challenges and Reflections of the WPI IQP Team

Although proper preparation allows a team to foresee issues and prepare solutions in advance, obstacles are inevitable during any project. Throughout the process, several challenges led to delays in the project timeline that is presented Appendix C. Section 5.2 reviews the hurdles encountered throughout the course of the project. The challenges faced involved navigating the language barrier between the WPI and HDU teams (see Section 5.2.1), managing the limited time the team had in Hangzhou (section 5.2.2), and addressing the gaps in expertise (see Section 5.2.3).

5.2.1 Language Barrier

The most significant challenge our team encountered regarded communication with our HDU team counterparts. A significant language barrier limited communication, as WPI team language skills were limited to English, and HDU student English abilities varied and were often limited. Some members of the HDU team spoke some English, but the bulk of our communication relied on machine translation apps and tools. These tools generally provided support, but the efficiency of our communication was often skewed by translation errors. A prime example of this issue was the end of project presentations. Since we discussed both presentations simultaneously due to time constraints, each team needed clarification on discussing one presentation with the other. This confusion hindered our ability to work as a single team, and lead to HDU and WPI producing separate results and conclusions for the sponsor.

This language barrier also interfered with our ability to collect data since the survey and interview participants only spoke Mandarin. Luckily, the HDU team was able to help the WPI

team with this language issue and aided significantly in the translation of the WPI survey and interview questions. Unfortunately, since we relied on machine translation of interview transcripts, everything needed to be carefully evaluated for accuracy. We utilized various translation tools to crosscheck results with the HDU team, which added an extra layer of difficulty in analyzing our data.

These barriers further manifested in our presentations to Yi Mi. While the sponsor liaison spoke English, the administrative staff and instructors at Yi Mi did not. To effectively communicate WPI team ideas, we summarized them succinctly in each presentation so that the text on the same slide could be translated into Chinese. Additionally, the liaison provided significant aid by translating our spoken information into Mandarin for the audience. Though the communication barrier during this project was a significant limitation, it was also a rewarding and valuable learning experience.

5.2.2 Time Constraint

Another challenge the team faced was the project time constraint. Though we had roughly four months to complete this project, the first two months were preparation for our time in Hangzhou. We needed to familiarize ourselves with the project and our sponsor, identify our goal and proper scope, develop a healthy team dynamic, conduct significant secondary research outlined in our background sections, plan our methodology, and construct a comprehensive project plan to execute in Hangzhou. Additionally, we were balancing our project work alongside our other classes at WPI. Our first two months of work have culminated in our introduction, background, and methodology sections, further refined throughout our time in Hangzhou.

After arriving in Hangzhou, we had seven weeks to complete our project. We spent the first four weeks refining our survey and questions, conducting interviews, reaching out for more survey results, and visiting Yi Mi to observe their outdoor area and classroom environments. After the conclusion of surveys and interviews, we only had three weeks to conduct data analysis and do additional research to provide more concrete recommendations to Yi Mi. Though we are satisfied with what we have presented to our sponsor, more could be accomplished with extra time. For example, a comprehensive design layout of Yi Mi's outdoor area should incorporate the suggestions in section 5.2. Though this could encompass an entirely other project in itself due to the necessary research and expertise required, it could serve as a next step for our project.

5.2.3 Expertise Gaps

The final challenge relates to the gaps in our expertise in the disciplinary knowledge related to the project goal and our sponsor. WPI, as an institution, is primarily focused on technology, engineering, and science. Moreover, our team consists of one Robotics Engineering and three Computer Science majors, all of whom needed additional education in the subjects related to this project. While we spent significant time conducting secondary research to familiarize ourselves with Montessori learning, nature-based education, and more, we are far from experts on these topics.

In contrast, Yi Mi's staff comprises of experts in early childhood education, Montessori, and nature-based learning. This affected our ability to provide recommendations, as we wanted to back our suggestions to Yi Mi with proven research, not only our own data and observations. We considered suggesting a design layout for Yi Mi's outdoor area, but our team lacked the required expertise in architecture, landscaping, and design. Regardless of this limitation, our

team enjoyed learning all that we did and look forward to where our new knowledge could bring us.

5.3 Conclusion

Our comprehensive evaluation of Yi Mi's nature-based program has provided valuable insights into its positive impact on the development and well-being of children. Through rigorous background research, surveys with parents, and interviews with instructors, we have uncovered the program's strengths in promoting student development and overall satisfaction among parents and children. The findings highlight the successful addressing of parental concerns about cleanliness and safety, contributing to the program's effectiveness.

However, challenges were identified, such as a lack of understanding regarding nature education among parents, and difficulty integrating nature into the Montessori curriculum. Thus, our recommendations for Yi Mi focused on enhancing curriculum design, improving the outdoor area, and fostering organizational support through increased parental involvement. By combining the nature and Montessori programs, incorporating more natural elements in the outdoor space, and offering opportunities for parent volunteering, Yi Mi can further elevate its nature-based approach.

Despite challenges in communication, time constraints, and expertise gaps, our team found the experience academically informative, culturally enriching, and beneficial to our professional development. We are optimistic that these recommendations, grounded in both data analysis and background research, will contribute to the continuous improvement of Yi Mi's nature program and serve as a foundation for future investigation.

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Appendices

Appendix A: Survey Preamble & Questions

Preamble

We are students from Worcester Polytechnic Institute and Hangzhou Dianzi University (HDU) who are conducting research on Yi Mi House's Montessori School's nature program. The purpose of this survey is to assess and develop Yi Mi's nature-based approach.

Your participation will pose no risks to you or result in loss of benefits. Responses will be anonymous. You may withdraw from the survey at any time without any consequences.

The following questions will ask you for your opinions regarding the effectiveness of Yi Mi's nature program in fostering the development and well-being of your children. If you have more than one child enrolled in Yi Mi, please consider the experiences of all the children.

Questions

1. What is your age?
 - a. < 25
 - b. 25 – 29
 - c. 30 - 39
 - d. 40 - 49
 - e. 50 +

2. How many children are in your household?
 - a. 1
 - b. 2
 - c. 3

- d. 4+
3. How many of your children are currently enrolled in Yi Mi?
- a. 1
 - b. 2
 - c. 3
 - d. 4+
4. Were your children involved in Yi Mi's nature classes before the start of the current school semester?
- a. Yes
 - b. No
5. How often do you do the following activities with your children?
- a. Gardening
 - i. Never
 - ii. Rarely
 - iii. Sometimes
 - iv. Often
 - v. Very Often
 - b. Hiking
 - i. Never
 - ii. Rarely
 - iii. Sometimes
 - iv. Often
 - v. Very Often

- c. Fishing
 - i. Never
 - ii. Rarely
 - iii. Sometimes
 - iv. Often
 - v. Very Often

- d. Picnics
 - i. Never
 - ii. Rarely
 - iii. Sometimes
 - iv. Often
 - v. Very Often

- e. Outdoor sports
 - i. Never
 - ii. Rarely
 - iii. Sometimes
 - iv. Often
 - v. Very Often

- f. Biking
 - i. Never
 - ii. Rarely
 - iii. Sometimes
 - iv. Often
 - v. Very Often

g. Walking in natural areas.

- i. Never
- ii. Rarely
- iii. Sometimes
- iv. Often
- v. Very Often

6. Please indicate how much you agree with the following statement: “My children have adequate access to an outdoor area to play.”

- a. Strongly Disagree
- b. Somewhat Disagree
- c. Undecided
- d. Somewhat Agree
- e. Strongly Agree

7. Please rate the extent to which you agree with the following statements after enrolling your children into Yi Mi’s nature-based program.

a. My children’s **physical agility** has improved.

- i. Strongly Disagree
- ii. Somewhat Disagree
- iii. Undecided
- iv. Somewhat Agree
- v. Strongly Agree

b. My children’s **coordination** has improved.

- i. Strongly Disagree
- ii. Somewhat Disagree

- iii. Undecided
 - iv. Somewhat Agree
 - v. Strongly Agree
- c. My children have more **positive interactions** with other children.
- i. Strongly Disagree
 - ii. Somewhat Disagree
 - iii. Undecided
 - iv. Somewhat Agree
 - v. Strongly Agree
- d. My children engage in more **cooperative play** with other children.
- i. Strongly Disagree
 - ii. Somewhat Disagree
 - iii. Undecided
 - iv. Somewhat Agree
 - v. Strongly Agree
- e. My children's **ability to problem solve** has improved.
- i. Strongly Disagree
 - ii. Somewhat Disagree
 - iii. Undecided
 - iv. Somewhat Agree
 - v. Strongly Agree
- f. My children's **creativity** has improved.
- i. Strongly Disagree
 - ii. Somewhat Disagree

iii. Undecided

iv. Somewhat Agree

v. Strongly Agree

g. My children's **attention span** has improved.

i. Strongly Disagree

ii. Somewhat Disagree

iii. Undecided

iv. Somewhat Agree

v. Strongly Agree

h. My children's **motor skills** have improved.

i. Strongly Disagree

ii. Somewhat Disagree

iii. Undecided

iv. Somewhat Agree

v. Strongly Agree

i. My children's **stress and anxiety levels** have improved.

i. Strongly Disagree

ii. Somewhat Disagree

iii. Undecided

iv. Somewhat Agree

v. Strongly Agree

j. My children's **knowledge about the natural world** has improved.

i. Strongly Disagree

ii. Somewhat Disagree

- iii. Undecided
- iv. Somewhat Agree
- v. Strongly Agree

8. Please rank the following development traits or behaviors from most important to least important, where (1) is the most important and (6) is the least important.

- a. Healthy social interactions between children
- b. Cooperative play between children
- c. Problem Solving
- d. Creative thinking
- e. Attention span
- f. Movement motor skills

9. Which of the following best describes your satisfaction with Yi Mi's nature-based education program?

- a. Very unsatisfied
- b. Unsatisfied
- c. Neutral
- d. Satisfied
- e. Very satisfied

10. How often have your children recounted any of their experiences and activities from the nature classes?

- a. Never
- b. Rarely
- c. Sometimes
- d. Often

e. Very Often

11. Are there any reasons you might not want your children to engage in nature classes?

- a. Practicality
- b. Safety
- c. Cleanliness
- d. Exhaustion
- e. Other

12. Do you have any thoughts on which aspects of the nature program can be changed? If

yes, please describe below in the text box below.

- a. Yes
- b. No

Appendix B: Interview Preamble & Questions

Preamble

The purpose of this interview is to assess and develop Yi Mi's nature-based approach. Your participation will pose no risks to you or result in loss of benefits. Responses will be confidential. You may withdraw from the interview at any time without any consequences.

With your consent, the audio of this interview will be recorded. Records of your participation or presentation of the data will not identify you. Do you consent for the participation and audio recording of this interview?

Questions

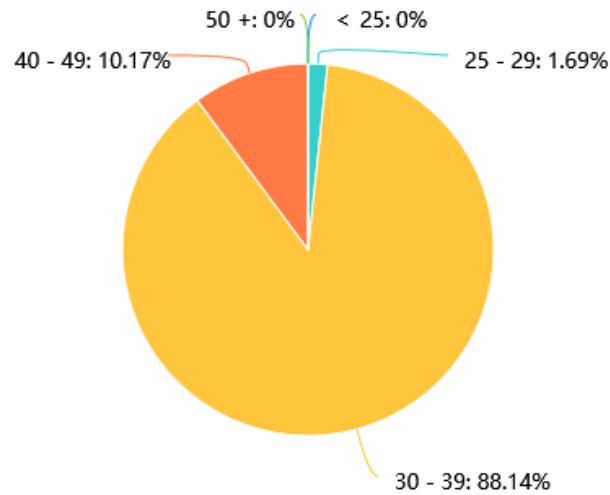
1. Can you tell me about your role and how you contribute to the nature program at Yi Mi?
2. How does Yi Mi integrate natural elements into the classrooms?
3. From the nature classes you have taught and/or seen offered, what classes have been the most and least popular with the kids? Why might that be the case?
4. What aspect of Yi Mi's nature program significantly influences children's development and well-being?
5. Can you share any observations or stories regarding how children respond and engage with the nature activities in the program?
6. Would you be willing to share how Yi Mi evaluates the effectiveness of nature classes according to the development of the child?
7. How does the outdoor area at Yi Mi support the children's experiences?
 - a. What aspects of the outdoor area are the least popular with the children? Why might that be the case?
 - b. Do you have suggestions for improving Yi Mi's outdoor area?

- i. What is your opinion on the artificial flooring in Yi Mi's outdoor area?
 - ii. Do you think any equipment can be added to Yi Mi's outdoor area to enhance the experience for the children?
8. How is the garden at Yi Mi incorporated into the nature class?
9. What qualities are essential for nature instructors, distinguishing them from non-nature instructors?
10. Yi Mi carries out parent-child outdoor classes on the weekends. Can you tell us more about the activities involved in the classes?
11. What differences have you observed between the students in nature classes and those in Montessori classes?
12. What qualities do children acquire from a Montessori program that differ from those who receive a traditional method of education?
13. Forest education often requires specific requirements, such as a secluded forest and teachers trained in nature-based education. What do you think is the biggest obstacle in introducing forest education into China?
14. How can children be given more opportunities to connect with nature in urban environments?
15. Are there any areas of the program that you think could be improved?
16. Do you have any suggestions for improving the effectiveness of Yi Mi's nature-based approach in fostering the development and well-being of children?

Appendix C: Survey Results

1. How old are you? [\[Multiple choice\]](#).

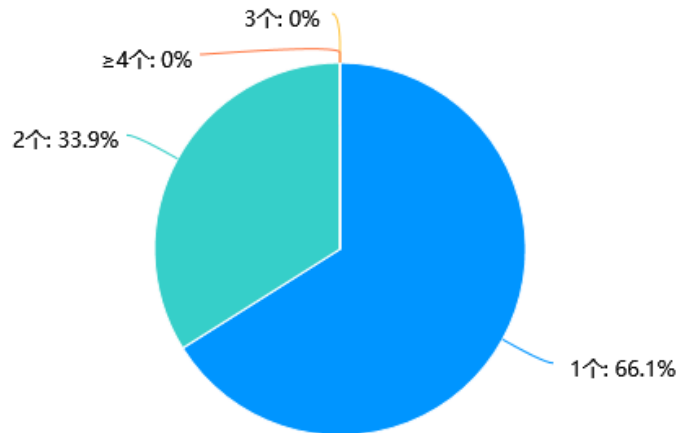
Options	subtotal	proportion
< 25	0	0%
25 - 29	1	1.69%
30 - 39	52	88.14%
40 - 49	6	10.17%
50 +	0	0%
Total	59	



2. How many children do you have? [\[Multiple choice\]](#).

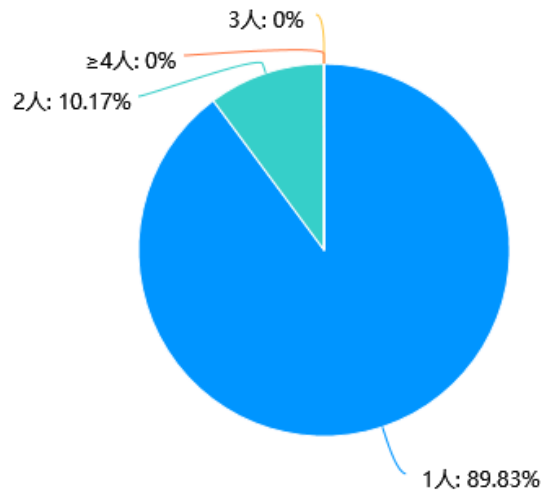
Options	subtotal	proportion
1 child	39	66.1%
2 children	20	33.9%
3 children	0	0%

≥ 4 children	0	<div style="width: 0%;"></div> 0%
Total	59	



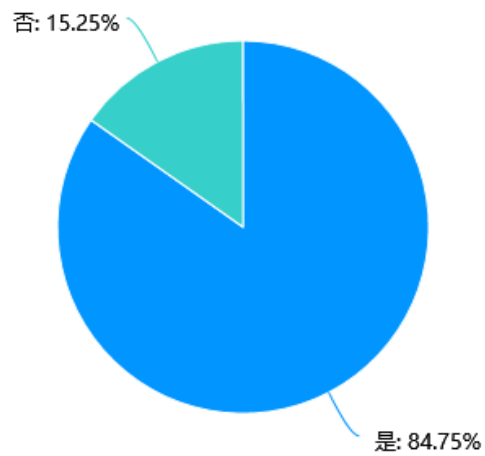
3. How many children do you have in Yi Mi? [\[Multiple choice\]](#).

Options	subtotal	proportion
1 child	53	<div style="width: 89.83%;"></div> 89.83%
2 children	6	<div style="width: 10.17%;"></div> 10.17%
3 children	0	<div style="width: 0%;"></div> 0%
≥ 4 children	0	<div style="width: 0%;"></div> 0%
Total	59	



4. Were your children involved in Yi Mi's nature classes before the start of the current school semester? [Multiple choice].

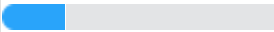
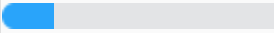
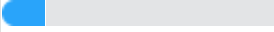


Options	subtotal	proportion
Yes	50	84.75%
No	9	15.25%
Total	59	



5. How often do you and your child do the following activities?

A. Gardening [\[scale question\]](#)






The average score of this question: 3.05

Options	subtotal	proportion
Never	13	 22.03%
Rarely	11	 18.64%
Sometimes	9	 15.25%
Often	12	 20.34%
Very Often	14	 23.73%
Total	59	

.

B. Hiking [\[scale question\]](#).

Average score for this question: 3.42

Options	subtotal	proportion
Never	3	 5.08%
Rarely	12	 20.34%
Sometimes	16	 27.12%
Often	13	 22.03%
Very Often	15	 25.42%
Total	59	

.

C. Fishing [\[scale question\]](#).

Average score for this question: 1.75

Options	subtotal	proportion
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Never	35	• • 59.32%
Rarely	14	• 23.73%
Sometimes	4	• 6.78%
Often	2	• • 3.39%
Very Often	4	• 6.78%
Total	59	

•

D. Picnic [\[scale question\]](#).

Average score for this question: 3.58

Options	subtotal	proportion
Never	3	• 5.08%
Rarely	13	• • 22.03%
Sometimes	10	• • 16.95%
Often	13	• • 22.03%
Very Often	20	• • 33.9%
Total	59	

•

E. Outdoor Sports [\[Scale Questions\]](#).

Average score for this question: 3.78

Options	subtotal	proportion
Never	2	• • 3.39%
Rarely	7	• • 11.86%
Sometimes	13	• • 22.03%

Often	17	• • 28.81%
Very Often	20	• • 33.9%
Total	59	

•

F. Bicycle Riding [\[Scale Question\]](#).
Average score for this question: 3.14

Options	subtotal	proportion
Never	11	• • 18.64%
Rarely	10	• • 16.95%
Sometimes	12	• • 20.34%
Often	12	• • 20.34%
Very Often	14	• 23.73%
Total	59	

•

G. Walking in natural areas [\[scale question\]](#).
Average score for this question: 3.47

Options	subtotal	proportion
Never	2	• • 3.39%
Rarely	13	• • 22.03%
Sometimes	16	• • 27.12%
Often	11	• • 18.64%
Very Often	17	• • 28.81%
Total	59	

6. Please indicate how much you agree with the following statement: “My children have adequate access to an outdoor area to play.” [\[scale question\]](#).

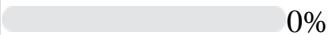
The average score for this question: 3.9

Options	subtotal	proportion
Strongly Disagree	3	5.08%
Somewhat Disagree	4	6.78%
Undecided	11	18.64%
Somewhat Agree	19	32.2%
Strongly Agree	22	37.29%
Total	59	

7. Please rate the extent to which you agree with the following statements after enrolling your children into Yi Mi’s nature-based program.


A. My children’s physical agility has improved. [\[Scale Questions\]](#).

The average score of this question: 4.1

Options	subtotal	proportion
Strongly Disagree	0	 0%
Somewhat Disagree	1	1.69%
Undecided	17	28.81%
Somewhat Agree	16	27.12%
Strongly Agree	25	42.37%
Total	59	

B. My children’s coordination has improved. [\[Scale Questions\]](#).

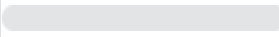
The average score for this question: 4.15

Options	subtotal	proportion
Strongly Disagree	0	 0%
Somewhat Disagree	1	* * 1.69%
Undecided	16	* * 27.12%
Somewhat Agree	15	* * 25.42%
Strongly Agree	27	* * 45.76%
Total	59	

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C. My children have more positive interactions with other children. [\[Scale Questions\]](#).

Average score for this question: 4.31






Options	subtotal	proportion
Strongly Disagree	0	 0%
Somewhat Disagree	1	* * 1.69%
Undecided	9	* * 15.25%
Somewhat Agree	20	* * 33.9%
Strongly Agree	29	* * 49.15%
Total	59	

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D. My children engage in more cooperative play with other children. [\[Scale Questions\]](#).

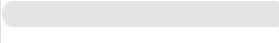




Average score for this question: 4.31

Options	subtotal	proportion
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Strongly Disagree	0	 0%
Somewhat Disagree	1	 1.69%
Undecided	9	 15.25%
Somewhat Agree	20	 33.9%
Strongly Agree	29	 49.15%
Total	59	

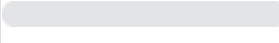


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E. My children's ability to problem solve has improved. [\[Scale Questions\]](#).
Average score for this question: 4.27

Options	subtotal	proportion
Strongly Disagree	0	 0%
Somewhat Disagree	1	 1.69%
Undecided	10	 16.95%
Somewhat Agree	20	 33.9%
Strongly Agree	28	 47.46%
Total	59	

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F. My children's creativity has improved. [\[Scale Questions\]](#).
The average score of this question: 4.2


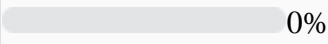
Options	subtotal	proportion
Strongly Disagree	0	 0%
Somewhat Disagree	1	 1.69%
Undecided	12	 20.34%

Somewhat Agree	20	• • 33.9%
Strongly Agree	26	• • 44.07%
Total	59	

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G. My children's attention span has improved. [\[Scale Questions\]](#).


The average score of this question: 4.22

Options	subtotal	proportion
Strongly Disagree	0	 0%
Somewhat Disagree	0	 0%
Undecided	14	• 23.73%
Somewhat Agree	18	• • 30.51%
Strongly Agree	27	• • 45.76%
Total	59	

•

H. My child's motor skills have improved. [\[Scale Questions\]](#).

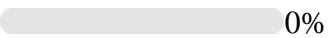
The average score of this question: 4.2

Options	subtotal	proportion
Strongly Disagree	0	 0%
Somewhat Disagree	1	• • 1.69%
Undecided	15	• • 25.42%
Somewhat Agree	14	• 23.73%
Strongly Agree	29	• • 49.15%
Total	59	

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I. My child's stress and anxiety levels have improved. [\[Scale Questions\]](#).


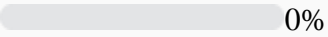
Average score for this question: 4.14

Options	subtotal	proportion
Strongly Disagree	0	 0%
Somewhat Disagree	2	* * 3.39%
Undecided	13	* * 22.03%
Somewhat Agree	19	* * 32.2%
Strongly Agree	25	* * 42.37%
Total	59	

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J. My children's knowledge about the natural world has improved. [\[Scale Questions\]](#).

The average score for this question: 4.54

Options	subtotal	proportion
Strongly Disagree	0	 0%
Somewhat Disagree	0	 0%
Undecided	4	* 6.78%
Somewhat Agree	19	* * 32.2%
Strongly Agree	36	* * 61.02%
Total	59	

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8. Please rank the following developmental characteristics or behaviors of the child from most important to least important, with (1) being the most important and (8) being the least important. [\[Sort Question\]](#).

Options	Overall score	1st	2nd	3rd	4th	5th	6th	total
Problem-solving skills	4.17	16(28.07%)	11(19.3%)	10(17.54%)	16(28.07%)	3(5.26%)	1(1.75%)	57
Social interaction between children	3.88	9(15.52%)	15(25.86%)	14(24.14%)	8(13.79%)	8(13.79%)	4(6.9%)	58
Motor skills	3.76	22(37.93%)	3(5.17%)	6(10.34%)	8(13.79%)	8(13.79%)	11(18.97%)	58
Creative thinking	3.29	6(10.53%)	10(17.54%)	12(21.05%)	9(15.79%)	13(22.81%)	7(12.28%)	57
Concentration time	2.9	6(10.53%)	10(17.54%)	6(10.53%)	6(10.53%)	14(24.56%)	15(26.32%)	57
Cooperative play among children	2.69	0(0%)	10(17.24%)	11(18.97%)	9(15.52%)	10(17.24%)	18(31.03%)	58

9. Which of the following best describes your level of satisfaction with the One Meter Nature Education Program? [\[Multiple choice\]](#).

Options	subtotal	proportion
Very Unsatisfied	1	1.69%
Unsatisfied	0	0%
Neutral	3	5.08%
Satisfied	23	38.98%
Very satisfied	32	54.24%
Total	59	

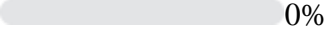
10. How often does your child tell you about their experiences and activities in nature Rarely? [\[Multiple choice\]](#).

Options	subtotal	proportion
Never	3	5.08%

Rare	6	• •	10.17%
sometimes	15	• •	25.42%
often	17	• •	28.81%
often	18	• •	30.51%
Total	59		

•

11. Are there any reasons you might not want your children to engage in nature classes? [\[Multiple choice questions\]](#).

Options	subtotal	proportion
No	49	• • 83.05%
Practicality	1	• • 1.69%
Safety	4	• 6.78%
Cleanliness	2	• • 3.39%
Exhaustion	0	 0%
Other reasons	9	• • 15.25%
Total	59	

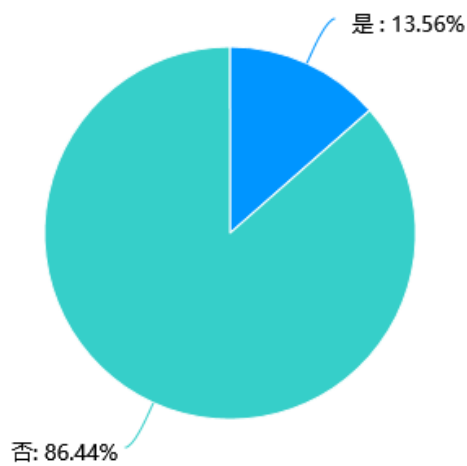
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12. Do you have any thoughts on which aspects of the nature program can be changed? If yes, please describe below in the text box below. [\[Multiple choice\]](#).

Options	subtotal	proportion
Yes	8	• • 13.56%
No	51	• • 86.44%

Total	59
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详细信息 词频分析

12.您是否认为自然项目可以在哪些方面进行改变? 如果是, 请在下面的文本框中进行描述。---选项详情

词频分析 搜索答案文本 搜索 过滤空选项 导出Excel

序号	提交答卷时间	答案文本	查看答卷
6	11月8日 13:51	将周六日的家长课堂 改成亲子自然活动	查看答卷
11	11月8日 13:55	老师配上, 个人感觉可以增加一下老师 这样各司其职有条不紊防患未然	查看答卷
54	11月15日 12:49	身体健康, 饮食规律, 四肢协调性, 创新能力 探索能力, 想象力	查看答卷
55	11月15日 12:55	出团前孩子身体健康状况的一般检查	查看答卷
58	11月15日 13:25	可以探索与日常生活的结合	查看答卷

共5条

每页 10 条 << < 1/1 > >>

Appendix D: Project Plan

