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## **Telling Stories and Taking Pictures: How children and teachers co-facilitate inquiry and reflection outdoors**

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### **ABSTRACT**

Play is crucial for early childhood development, and outdoor play fosters exploration and inquiry. Inquiry is a cyclic process of observing, forming questions, finding answers, and reflecting. Little research examines reflection in early childhood, and the current project addresses this gap by studying children's inquiry and reflection skills in an outdoor preschool. Ten children aged 3-6 years, already enrolled in the school's Afternoon Forest Adventures class, were observed twice a week interacting with each other, their teachers, and the environment. During these visits, the researcher participated in the pedagogical documentation process, reporting experiences through audio-recording children's conversations, taking photographs, and creating portfolios. Similarly, children took photos and had the opportunity to reflect on them. Detailed notes were taken alongside the photos, videos, and audio recordings by the researcher. Utilizing the Sort and Sift, Think, and Shift method, the photos were grouped into patterns identified across children's photos then cross referenced with children's verbal reflections and researcher observations of their play in a series of iterative analytic processes. Three key themes emerged from the data: 1) cameras act as inquiry and reflection tools; 2) cameras serve as an additional form of communication for young children; and 3) photos taken by children interact with affordances of the natural environment. These findings are critical for advancing early childhood education and development because they illustrate effective learning strategies driven by child-led inquiry.

**Keywords:** outdoor education, pedagogical documentation, photovoice, early childhood, Reggio Emilia-inspired, inquiry, reflection

Within early childhood education, the outdoor environment is well established as a learning environment that produces organic inquiry, discovery, and play. Naturally, learning is encouraged through the dynamic nature of outdoor learning contexts. With the ever-changing environment, children's curiosity is given the opportunity to flourish and there is always something new to be explored. The natural environment supports children's excitement, inquiries, and exploration (McClain & Vandermaas-Peeler, 2016). Centering time spent outdoors around children's inquiries opens the door for creating a curriculum that is relevant and of interest, thus maximizing the efforts in the classroom and increasing student autonomy of learning (Kumpulainen et al., 2014).

Reggio Emilia-inspired education prioritizes children's inquiries and emphasizes the importance of giving time and thought to the processes of observation, questioning, discovery, reflection, and integration (Katrein, 2016). Reflection is highlighted in education curricula as a necessary skill and something that needs to be scaffolded throughout the entire educational process (McNaughton, 2016). Yet, it is frequently left out of the learning cycle in early childhood.

Inspired by the Reggio Emilia approach, photo-documentation as a reflective tool was implemented in this study. In Reggio Emilia-inspired pedagogies, teachers take photos, share their reflections with parents and children, and then integrate reflections into the students' future projects (Katz, 1998). This is a cyclical reflective process designed to prioritize and center students' interests as well as ensure that teachers are taking their time in understanding students' curricular interests. Mirroring the use of photography as a non-verbal communication tool furthers the Reggio Emilia-supported philosophy that children are co-researchers (Edwards, 2011; Inan et al., 2010). Wang and Burris (1997) introduced this methodology and coined the term photovoice, describing a process where participants take photographs to represent their knowledge and thoughts. In an Icelandic classroom, photovoice was used as a means of expanding communication with children (Einarsdottir, 2005). Photovoice gave children autonomy and ownership over their unique thoughts and discoveries.

The present study aims to deepen understanding of the impact of introducing cameras to preschool children within the United States context. Inquiry and reflection processes, communication enhancement, and connection to peers, teachers, and nature were explored through the mosaic approach, using varying mediums to collect data (Clark & Moss, 2011). This in-depth case study of an entirely outdoor, Reggio Emilia-inspired preschool used child photos as well as researcher photos, videos, notes, and audio recordings, and children's inquiries were brought to the forefront of the cyclical process of child-centered curriculum.

#### *The Learning Context: Outdoor Preschool*

Within recent years, outdoor play has been diminishing at an alarmingly rapid rate (Bento & Dias, 2017; Moore, 2017). Sedentary lifestyles are becoming more common, childhood obesity rates are increasing, and children's desires to play outdoors are becoming obstructed by competing interests (Louv, 2008; Vilchis-Gil et al., 2015). The shift away from nature has resulted in the rise of "nature deficit disorder," a construct coined by Louv which results in diminished use of the senses, attention deficiencies, and more physical and emotional illness (Louv, 2008, p. 36). Spending unstructured time outdoors is critical, as it is associated with children's social and emotional skills, gross motor skills, and cognitive development (Dankiw et al., 2020). At preschool age, specifically, play is critical for development, and outdoor play in particular lends itself to exploration, inquiry, and opportunities for physical stimulation. Additionally, risky play is more accessible outdoors than indoors, and has been found to have numerous benefits such as, "increased physical activity, improved motor/physical competence, higher ability to assess risks and handle risk situations in an appropriate way, positive psychological outcomes, and general health" (Sandseter et al., 2021, p. 304). Currently, children are coming up short in their time spent outdoors and this can be linked to the increase of technology use in today's society. As one fourth grade boy said, "I like to play indoors better, 'cause that's where all the electrical outlets are" (Louv, 2008, p. 10).

Outdoor early childhood programs fill the deficit between increased technology use and less time spent outdoors by providing increased opportunities for children to play and learn outside, as compared to more traditional schools (Welch, 2023). Observation and discovery are encouraged by the constantly changing nature of the outdoor environment. Many outdoor education programs are centered around inquiry-based learning (McClain & Vandermaas-Peeler, 2016; Tiplady & Menter, 2021).

The research context is an outdoor preschool, The Wildflower School, inspired by the Reggio Emilia approach founded by Loris Malaguzzi, an early childhood educator. The approach was developed in Emilia Romagna, Italy, a town known for its strength in community following WWII as a part of a post-war reconstruction effort. The holistic Reggio Emilia early childhood education approach is internationally recognized as an exemplar of a high-quality social constructivist approach (Edwards et al., 2011; Inan et al., 2010). In the United States and elsewhere in the world, the term "Reggio Emilia-inspired" has come to symbolize children and teachers as co-researchers, where the child's inquiries are highly valued. As expressed in the poem *Hundred Languages of Children*, children have multiple languages, including expressive, communicative, symbolic, cognitive, ethical, metaphorical, logical, imaginative, and relational and their learning environments mirror and support children's diverse pathways of learning (New, 2007). To support this philosophy, the natural environment serves as the third educator, providing rich academic, social-emotional, and physical learning opportunities (Torquati & Ernst, 2013).

Malaguzzi believed that preschools should cater to the philosophy that children are natural researchers and should be afforded the opportunity to fulfill their curiosities and discoveries (Malaguzzi, 1996). Crafting a co-researching relationship with a child as a learning tool enables them to build a sense of ownership, autonomy, and interest with the learning topic. In the outdoor setting, environmental education can naturally occur when a child's inquiries are encouraged and prioritized. In practice, teachers are reflective about children's interactions with their environments, and use their own observations, accompanied by ongoing participation of children and parents, to guide conversation and curricula. Combining child-centered learning, the importance of the outdoors, and partnership in the classroom community results in a cyclical design of learning, prioritizing the inquiry-reflection processes of observation, questioning, discovery, reflection, and integration (Katrein, 2016).

### **Inquiry and Reflection Through Pedagogical Documentation**

In the early stages of preschool education, children engage in the inquiry-reflection cycle often. In a preschool garden, for example, children begin the inquiry-reflection cycle through observing and questioning while digging, planting seeds, and picking plants, among other activities (Lanphear & Vandermaas-Peeler, 2017; Vandermaas-Peeler & McClain, 2015). Reflection and integration conclude this cycle through comparing methods used while planting and discussing what different plants need and why. Inquiry processes have been examined in early childhood education research, however, there is less literature examining reflection processes in young children. Thus, little is known about what reflection looks like in early childhood and how teachers guide this important step in inquiry-based learning.

To encourage and better examine reflection in early childhood, pedagogical documentation was introduced as a method for uplifting students' inquiries for further discussion (Edwards et al., 2011, p. 225). Pedagogical documentation in the early childhood context can include documenting experiences through audio-recording children's conversations, taking photographs, and creating portfolios (LeeKeenan, 1992; Merewether, 2018; Rayna & Garnier, 2021). Pedagogical documentation helps to aid educators and students in taking note of an experience as it is happening and then learning from it. When a child is presented with the opportunity to talk through their processes the capacity of understanding is broadened, and the child is shown that their thoughts and ideas are valuable and worth sharing (Green, 2015). When both the teachers and students are engaging in pedagogical documentation, it creates a medium of communication that makes the learning more tangible and easier to talk through with others (Macdonald & Hill, 2018; Rayna & Garnier, 2021). Merewether (2018) kept a weekly, handwritten documentation book during one of her studies in a preschool. She modeled reflective practices and showed the students that they were equally valuable members of the research team. Every week the book was put on display and served as a vehicle for children to deepen their reflection process by engaging in conversations about the findings reported in the book (Merewether, 2018). The present study is built on Merewether's techniques by examining the important process of pedagogical documentation and including reflective practices in outdoor education in early childhood.

### **Research Questions**

Studying inquiry and reflection in outdoor environments with preschool teachers and children as co-researchers is the central aim of this research. Specifically, the primary questions were: (1) How do cameras act as tools to facilitate the inquiry and reflection cycle, specifically in outdoor education? (2) How do children's photos serve as a communication tool? What can we learn from children's photos? (3) How do affordances in the natural environment interact with the pictures children are taking?

## **Method**

### **Participants**

The participants included 10 children, seven female and three male, ages 3-6, attending an entirely outdoor Reggio-Emilia inspired preschool, The Wildflower School. The students participated in an Afternoon Forest Adventures class which was observed one to two times a week from August through June. Six children also attended a separate

morning class at the school, meanwhile the other four only attended the afternoon classes which ran from 1:00 pm to 4:30 pm. Afternoon Forest Adventures Class was led by a full-time teacher and assistant director at The Wildflower School. She has an extensive background in the school system specifically working in special education classrooms, as well as educational background of the Reggio Emilia approach.

### Setting

The Wildflower School has multiple outdoor spaces for students to explore, such as the lower forest, upper forest, barn, animal grazing area, and the pasture as shown in Figure 1. Most days are organized into hour-long sessions in each outdoor location where children guide their own play and discovery. Specific learning goals guide the school year and are heavily influenced by the school's values: noticing, engaging, expressing and collaborating.



Figure 1: Pasture at the Wildflower School

### Procedure

The study was approved by the university Institutional Review Board. Parent permission was obtained for all participating children and the children's names reported here are pseudonyms. The first author observed the Afternoon Adventures class for an entire academic year, beginning in September 2022 and concluding in June 2023. Once to twice a week, the researcher visited the classroom and documented through audio recordings, video recordings, photos, and handwritten notes. Child-friendly cameras were introduced in February and used seven times over the following months. Children were given the opportunity to utilize the cameras parallel to their ongoing play, but only if they chose to do so. Some reflective conversations occurred immediately after the children took photos. After children took photos, the researcher would organize them into categories then bring electronic versions back to the class during the next visit. Conversations with the children were facilitated using the photos as a guide for reflection. On the final researcher visit photos that had already been organized by child and category were strung through one of the forest classrooms and audio recordings of the children's reflections were collected, as shown in Figure 2.



Figure 2. Children looking at their photos strung up in the middle of one of the forest classrooms

## Coding

All seven days of children's photo-documentation were coded alongside researcher recordings and documentation using the Sort and Sift, Think, and Shift method (Maietta et al., 2021). Through a series of iterative processes, salient categories were initially identified in children's photos, video and audio recordings, and researcher observations. The photos were first grouped into patterns such as animals, selfies, other people, objects, nature, school house, camera movement, close up, looking up, looking down, upside down, and filters (on the cameras). Then, the categories were cross-referenced with researcher observations as well as children's verbal reflections collected through video and audio recordings and sorted into themes. Through repeated sorting and sifting through categories across data sources, cross-cutting themes were identified.

## Results

To understand how preschool children's use of photography can impact their inquiry and reflection skills the researchers found patterns in the photos to guide conversations. These qualitative analyses produced three key themes: cameras act as inquiry and reflection tools, cameras serve as an additional form of communication for young children, and photos taken by children interact with affordances of the natural environment. Table 1 shows examples as they pertain to each key theme.

### Children's Use of Digital Cameras in Outdoor Environment

Children's use of the cameras was entirely at their discretion. On any given day the children chose to use a camera, they took as many photos as they pleased, and the subjects of the photos reflected their interests. Little instructional guidance was given to encourage individual inquiry through the lens of a camera. Most pictures inherently included aspects of the natural world, due to the outdoor environment that served as the "classroom." Thus, components of nature and affordances of the natural environment appear as the primary subject of most photos. Animals were not only photographed often, but children also took a photographic interest in their peers interacting with the animals. Plants such as leaves, trees, bushes, and dirt hills were accompanied in pictures by light patterns and shadows. As weeks progressed and the children became more familiar with using the cameras, they began to angle the cameras to capture different views of their subjects from dirt-covered ground to sunny skies. Through the use of the inquiry-reflection process, children learned to utilize intentional camera movement as a technique in their photos to create a blurred effect. Lastly, the children took photos of people including themselves, their peers, and teachers. Pictures of others varied from candid shots of friends playing to posed portraits. This afforded opportunities for discussion of obtaining consent from someone before taking their picture. The teachers equipped the children with questions such as, "Can I take a picture of you?" and empowered the children to answer honestly and respectfully with phrases like, "No, not right now, I am in the middle of playing."

Table 1  
*Examples of the Main Themes*

Themes	Examples		
Cameras act as tools in the inquiry-reflection cycle, specifically in education that centers children's interests in the design of the curriculum.	Angela, Wax Inquiry	Irene, Camera Movement	Irene, Food Pictures
Children's photos serve as a communication tool.	Nicole, Pictures of People	Angela, Interacting Through the Camera	Andrew, Non-Verbal Reflection

The pictures that children take interact with the affordances of the natural environment.	Interaction with Animals	Light and Shadows	Taking Pictures Upward
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### **Cameras act as tools in the inquiry-reflection cycle, specifically in education that centers children's interests in the design of the curriculum**

When children use photography to engage more deeply than usual with elements in the environment, they are practicing the first part of the inquiry cycle, observation. Questioning follows within conversation about the photos that the children take. Children uncover and discover new information and begin to form new inquiries and questions as a product of reflection. Integration naturally leads to the following observations and questioning to come. The following examples illustrate this process.

Angela, Wax Inquiry: The school house served as a space for bad weather days, bathroom breaks, and snack breaks. On March 22, while in the school house, Angela kept her camera around her neck as she played. Inside the school house there is a light room with many reflective materials, which Angela had been exploring. After becoming particularly interested in the ceiling, Angela made her way to the couch in the reading area to get a better look at what was above her, with her camera. As Angela used her camera, her eyes wandered to a shelf which was positioned to create a barrier to the kitchen. These shelves were always in the same place and housed the same materials. However, when Angela positioned her camera to look closer at the shelves and its contents she became increasingly interested in a box that contained un-melted soy wax beads. Photos of her observing as well as photos that Angela took are shown in Figures 3, 4, and 5, below. This inquiry sparked a full conversation with the teacher:

The researcher: What, what is it?  
 Angela: It's...Why is that bin...  
 The researcher: What is it over here?  
 Angela: It's in a pot.  
 The researcher: Is it this?  
 Angela: Yeah.  
 The researcher: What's interesting about it?  
 Angela: I don't know, but I just like it.  
 Teacher: Do you want to come over here? You can probably reach and touch it. Oop. Be careful.  
 What, what do you think?  
 Angela: Cool.  
 The researcher: Does it remind you of anything?  
 Angela: Of wax.  
 The researcher: Wax?  
 Angela: Yeah.  
 The researcher: Yeah, I think you're right. I wonder what it was used for.  
 Teacher: Put your hand here, Angela. [inaudible 00:00:56] in the bucket. Do you know what this is? Soy wax to make candles.  
 The researcher: Soy wax. I never heard of that.  
 Teacher: To make soy candles, but it feels really cool to touch. Does that feel good?  
 Angela: It tickled when you put it on my hand.  
 Teacher: Yeah, it does tickle. Do you want to take a picture? Careful of your body.  
 Angela: [takes picture]

Angela's curiosity about the soy wax beads was facilitated by her use of the camera. Her eyes were guided by the lens and ultimately aided her in the discovery of a new material. Every step of the inquiry and reflection process is portrayed through this interaction between Angela, her camera, and the teacher. First, Angela observed the wax beads, followed quickly by questioning what the beads were. She analyzed the shape, color, and made a guess at what they were. She reflected on what the beads felt like and what they could be used for.



Figures 3 and 4. Angela engaging with soy wax.



Figure 5. Angela's photo of the wax.

Irene, Camera Movement: Over time the children practiced reflecting on pictures through the scaffolded reflection process facilitated by the researcher. This included offering the children an opportunity to take pictures, sorting through each child's photos, and bringing them back for discussion during the next visit. After four months of this process, Irene approached the researcher with her camera while taking photos and eagerly asked to show some of the pictures she had taken that day. She showed blurred pictures, featured in Figures 6, 7, and 8 below, and said,

Irene: I spinned and did that. It's a blob.  
The researcher: A blob? Because you spun?  
Irene: Yeah. I spinned. That was funny.

Irene's interaction with blurry photos demonstrates her active participation in the inquiry process. She observed her first blurry photo and acknowledged her inquiry by taking more. Questioning occurred through experimentation with the way that the camera's movement related to her body positioning as well as the outcome of the photo. After lots of practicing, Irene deepened her understanding through verbalization of her new photography skill, leading to integration of this knowledge into future photos.





Figures 6, 7, and 8. Irene's blurry photos.

Irene, Food Pictures: Irene frequently played by herself, often making visits to the mud kitchen. On this particular day (June 5) Irene had worn a camera around her neck while she worked on her creations. Once satisfied, Irene took many photos of her food. The same day, Irene approached the researcher with her camera to proudly show the photos she took in Figures 9, 10, and 11. She pointed out the pictures of her creations and explained what food she made as well as a story to go along with the food.

- Irene: It's a cake.  
The researcher: A cake? What-  
Irene: Actually, no, it's an egg, because of that green in the middle.  
The researcher: What kind of egg? Like a fried egg, sunny side up egg?  
Irene: It's a fried egg.  
The researcher: Nice. Oh, I see. Even closer picture.  
Irene: Yeah. So I could see the leaves better.  
The researcher: Oh, where'd it go?  
Irene: I ate it.  
The researcher: This is a cool picture.  
Irene: Yeah, that is. It's because the plate's gone. And I meant people to be so surprised that the plate's gone. Because I ate the plate.

Irene demonstrated her inquiry through taking her mud-kitchen creations one step further and capturing a photo. Within her explanation she made observations about the creations as well as reflected on what her intentions were. Additionally, she displayed metacognitive skills when she said, "And I meant people to be so surprised that the plate's gone."



Figures 9, 10, and 11. Irene's food photos.

### Children's photos serve as a communication tool

In early childhood, linguistic skills are still developing, which lead to miscommunication between preschoolers and their teachers. Supplementation of communications with photographs can aid in teachers' understanding of children's interests and curiosities. The following examples demonstrate how this process can give freedom to a



child who may not feel comfortable or confident sharing with words their thoughts, feelings, or inquiries. Additionally, a child who may need extra time to transform their thoughts into words could benefit from having another tool to express what they are thinking.

Nicole, Pictures of People: Nicole is a child who frequently spent her time with the teacher or by herself. Almost half of Nicole's photos were of other people, as seen in Figure 12. The teacher provided input regarding this emerging pattern and suggested that the cameras may be a tool for Nicole to communicate her desires or to interact with her peers in a different way. The Reggio Emilia approach encourages teachers to take an observational role in children's learning. Nicole helps to expand understanding of her perception of her social environment by frequently taking photos of her peers.



Figure 12. Nicole's photo of peers.

Angela, Interacting Through the Camera: On multiple occasions, Angela took pictures of things that she had a hard time reaching or was not allowed to touch. Figure 13 is one example of an object that had boundaries placed on it. As a way of exercising patience and listening to boundaries, whether they be physical or set by the teacher, Angela found an alternative way of exploring things of interest. She took photos of these objects and reflected on this experience:

Angela: So I took a picture of your backpack.

The researcher: Do you remember when I brought this backpack? Which is, is that the same or different from the backpack I normally bring?

Angela: Different.

The researcher: Yeah. You guys were really interested in what I had on it. I told you you couldn't touch it. So what did you do instead?

Angela: Take a picture.

Giving children an alternative option to interact with something usually off limits can present them with autonomy, empowerment, and exploration. This deepens their learning in the moment and in the future, providing them with many ways to show interest in new observations.



Figure 13. Researcher backpack that Angela was told was off limits to touching.

Andrew, Non-Verbal Reflection: Andrew was looking through pictures he had taken of trees at different angles, observed how light interacted with the trees, and looked at how light interacted with other elements of the classroom, depicted in Figures 14, 15, and 16. When talking about the pictures, he used simple sentences and did not elaborate:

- Andrew: I took that picture.  
Sophie: You took this picture? What is this picture?  
Andrew: That's mine.  
Sophie: Yeah, but what is it of?  
Andrew: The trees over there.  
Sophie: Oh, what made you want to take a picture of the trees over there?  
Andrew: Because they looked cool.  
Sophie: They looked cool? Let's see what else we got. Another tree.  
Andrew: Tree of somewhere there.  
Sophie: Over there? And more.  
Andrew: That one of those three trees are together.  
Sophie: Oh. I think it's cool how they grew all together. Yeah.  
Andrew: And that one is of the bench now.

Through verbal reflection, Andrew did not articulate deep thoughts on the photos he took. However, looking through his photos allows for his teacher to see where his interests may lie and potentially guide conversation and activities in the class to tend to deeper learning of those specific topics such as trees, light, and light reflection.



Figures 14, 15, and 16. Andrew's photos

### The pictures that children take interact with the affordances of the natural environment

Time spent outdoors can have a positive impact on children's development of body awareness and motor skills as well as understanding how complex science and math concepts work in the world. Photography is used to add depth to the learning process for preschoolers. Through hypothesizing and testing, preschoolers build on concepts that relate to animals, such as feeding routines, taking care of a pen, and the life cycle. Children's photos show an early understanding of time and weather through pictures of light and shadow. Additionally, math concepts and metacognition are developed in real-world application by taking photos from different angles.

Interaction with Animals: On a day when significant time was spent on the farm, six children took photos. Every child who took photos included animals as the subject of some of their photos. While looking over the pictures together, Irene used reflection as a way of deepening her understanding of the farm animals. Figure 17 shows the picture of a chicken being debriefed in the conversation below.

The researcher: What is this chicken doing?

Irene: He is picking at the ground.

The researcher: What do you think he's doing that for?

Irene: I don't know, he's looking for bugs. Oh, he is looking for bugs. He's looking for bugs. That chicken's moving. So it's kind of blurry.



Figure 17. Irene's photo of a chicken.

Haley reflected on the pictures she took of Nicole interacting with the animals, as shown in Figure 18.

- The researcher: So let's see. Haley, you took the most pictures of people. So we want to see those first?
- Haley: No, I want to see animals.
- The researcher: Animals? Okay.
- Haley: That's one of Nicole.
- The researcher: Nicole. What is Nicole trying to do?
- Haley: Trying to pet her. Trying to pet the chicken.





Figure 18. Haley's photo of Nicole petting the chicken.

In these two interactions Irene and Haley are building their understanding of what the farm animals, in this case chickens, do. The children were encouraged to question and create hypotheses about the chickens' behavior and then afforded an opportunity for deeper, educational conversation to be facilitated based on their photos.

Light and Shadow: Andrew took the largest number of pictures of nature compared to his peers. There is a recurring theme of light and shadows being featured, as seen in Figures 19, 20, 21, 22, 23, 24, 25, 26, and 27. This was not something that was reflected on verbally, rather Andrew showed his interest, inquiries, and observations through the use of the camera. Beginning to notice the ways that the sun interacts as a component of our natural world is so complex and has implications for understanding weather science, angles, time, etc.



Figures 19-27. Andrews photos of light and shadow in nature.

Taking pictures upward: Angela took photos looking upwards on many occasions, spread out across a couple of months. The pictures are in chronological order. Figure 28 shows a photo the researcher took of Angela taking her first upward facing photos. The following Figures, 29, 30, 31, and 32, show the photos Angela took. By the final photo she has taken a photo of her classmate who is also taking a picture of the elements above him. Her idea and understanding of the world above was evolving, and this breadth of perspective-taking became apparent to her educators through her photos.



Figure 28. Angela taking her first photo upwards.



Figures 29-32. Angela's upward photos overtime.

### Discussion

The purpose of this study was to examine the intersection of the Reggio Emilia approach to education, the outdoor learning environment, and photo-documentation on the development of the inquiry-reflection process in early childhood. In particular, we investigated how cameras act as tools to facilitate the inquiry and reflection cycle, how children's photos serve as a communication tool and what we can learn from children's photos, and how affordances in the natural environment interact with the pictures children are taking. Photographs were utilized to put the children's learning experiences into context, delving beyond verbal descriptions. Einarsdottir's (2005) study on using photo-voice methodology in early childhood education explains how photo-documentation centers children's perspectives within their learning. In the afternoon adventure class studied in the present research, cameras acted as inquiry and reflection tools, served as an additional form of communication, and connected children with the affordances of the natural environment.

Existing work demonstrates that children's inquiries are centered in Reggio Emilia approaches to education and enhanced by supplemental photo documentation (Edwards et al., 2011, p. 225). This study expands on this knowledge by highlighting that children's parallel participation in photo-documentation can be an additional tool in

the communication of their inquiries and their introduction to the process of reflection. Previous research shows that outdoor schools provide accessibility to a dynamic learning environment and positive byproducts of spending more time outdoors such as development of gross motor skills, increased physical and general health, and enhanced risk assessment and management (Louv, 2008; Welch, 2023). This study showed that in addition to these previously established benefits, utilization of a camera in an outdoor context can aid in building affinity with the natural environment, encouraging child-centered approaches to education, and facilitating development of meta-cognition.

The credibility of photo-documentation as a tool for reflecting on children's inquiries in preschool classrooms was established through the pedagogies of the Reggio-Emilia approach to education (Katz, 1998). The introduction of children mirroring the use of photography to serve as an extension of communication has been modeled in Swiss and Icelandic classrooms (Butschi & Hedderich, 2021; Einarsdottir, 2005). This study incorporates the United States context into the conversation of alternative communication tools in early childhood learning environments. Additionally, this study combines the child-centered focus of photo-voice methodology and Reggio-Emilia education, with the outdoor environment, providing a unique intersection of learning approaches. The case study design of this project limited the generalizability of the study. Future research could replicate a broader participant pool aiming to uncover the implications of varying locations, demographic backgrounds, ages, types of schools, etc. However, the Wildflower School blended the pedagogies being studied harmoniously, expanding on the field's understanding of the application and implication of child-centered learning among the various contexts of outdoor education, pedagogical documentation, and Reggio-Emilia inspired education.

Photos were only taken when the researcher was present, once to twice a week, and photos are merely snapshots. Therefore, deep analysis on some photos could not be isolated when interpreting children's inquiries and reflections. Opportunity for future research could explore alternative methods of communication that span beyond verbal techniques to create a more holistic, mosaic approach to understanding children (Clark & Moss, 2011). Uncovering how preschool children express their thoughts, aids in supporting teachers working toward creating child-centered classrooms. Within the present study, the photos told the story of individual children's inquiry-reflection cycle through demonstration of observation (e.g., taking the initial photo), questioning and discovery (e.g., taking subsequent photos), reflection (e.g., looking back at photos and talking through processes, observation, and/or questions), and integration (taking more pictures extending new knowledge and understanding), thus, the entire cycle of inquiry (Katrein, 2016). Analyzing children's photos allowed for deeper insight on children's inquiries beyond standard communication. Incorporating children into the process of analysis by encouraging conversation on photos from earlier in the day, week, or month further engaged the child as the co-researcher and uplifted their interpretations within the study (Green, 2015).

Early childhood classrooms can adapt photo-voice methodology by making cameras readily available for children to use whenever they please. Modeling interaction with the inquiry cycle through the use of cameras can foster teacher-student communications (Merewether, 2018). Additionally, children's inquiries are encouraged when the teachers acknowledge their photo-documentation process. This can encourage autonomy for the child while fostering a learning environment efficient for growth and development that is responsive to the child's interests (Macdonald & Hill, 2018; Rayna & Garnier, 2021).

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