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Moving Toward Nature: Teacher Candidates' Experiences with Nature-Based Learning in a Nature Reserve Field Setting

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ABSTRACT

Nature-based early childhood education programs and nature-based learning initiatives have deep roots in historically documented European nature education and the American Nature Study Movement. Education experiences in nature are designed to capitalize on the curiosity and natural explorational tendencies of young children to support quality and health-conscious early childhood learning experiences. While significant documentation exists that education in nature is beneficial for early childhood students, there are significantly fewer opportunities to explore the impact of putting teacher candidates into these unique placements or how implementing a field course at a nature reserve might affect a teacher candidate's attitude, skill development, and confidence toward educational experiences in natural environments. The lack of research begs a need for more exploration of field partnerships in nature-based preschools or in programs which contain elements of nature-based learning to attempt to find patterns in the development of teacher candidates who participate in these unique settings. This article is a qualitative study of a year-long field partnership between an early childhood teacher preparation program and a local nature reserve. The local nature reserve became a field site opportunity for candidates to be introduced to nature-based learning initiatives. Areas for research included the examination of reflections and focus group interview data related to participant prior knowledge, definitions, attitudes, and skill development.

***Keywords*:** early childhood, teacher preparation, nature-based learning, field experience in nature

Nature programming initiatives in early childhood education settings have a long history in the United States with significant documented growth over the last five years (North American Association for Environmental Education, 2020). Programs set in nature are a popular and fast-growing portion of the programming choices available to families through both school (nature-based education initiatives, outdoor schools, and forest schools) and public (nature sites, museums, parks, etc.) educational settings. Teacher education has lagged in meeting the need for highly qualified professionals to serve in these unique program types. With the types of programming for early childhood educators varying greatly between teacher education programs (Born, 2021), more research is needed to understand how infusing field components in nature could impact teacher candidate development. The aim of this study is to contribute to the existing educational research about the experiences of teacher candidates exposed to the principles of nature-based learning.

Literature Review

In the United States, there is a long and well-documented history that pairs nature-based education and quality early childhood programming. The movement toward more nature-based initiatives have been rooted in both outdoor classroom initiatives and the forest school initiatives of many European countries (Forest School Foundation, 2020). Roots of nature-based education are discussed as early as the late 1800s with the dawning of the American Nature

Study Movement encouraging learning from nature and not just books (Armitage, 2009). The Forest School Foundation (2020) also describes significant examples of the first forest school in Denmark in 1952, the "rain or shine schools" in Sweden in the 1980s, and the forest schools of 1960s Germany as historical evidence of the beginnings of these popular programs with even more models existing today worldwide. In the United States, the first forest school concept occurred in Laona, Wisconsin in 1927 based on a tree-planting project that had been observed in Australia (Forest School Foundation, 2020).

As of 2020, there were 585 nature schools (nature-based preschools, forest kindergartens, and outdoor schools) in the United States (North American Association for Environmental Education (NAAEE), 2020). This number is only representative of nature-based schools and does not include numbers of educational programs for young children that exist in public educational settings such as parks (state, local, and national), museums, historic sites, zoos, nature reserves and others. Statistics from the Natural Start Alliance, an organization concerned with improving educational access to nature, indicates by their membership numbers and maps that the growth of nature-based programs is likely much higher when considering non-school places that provide outdoor environmental early childhood programming (Natural Start Alliance, 2019). These statistics serve as evidence of a growing need for well-trained and highly qualified professionals to serve in all types of early childhood educational placements that have a nature setting or are by definition, nature-based.

An initial definition of nature-based education in the literature is described as "children's active learning in the natural world in which children are afforded regular opportunities to interact with nature" (Meier & Sisk-Hilton, 2013; Prochner, 2021, Defining Nature-Based Education section, para. 1.). While this definition does describe what nature-based educational opportunities are, it does not fully demonstrate the theory, mindsets, and pedagogies that are required of professionals working in early childhood educational settings where nature is either the main conduit of all experiences or a supplementary experience for students. In the last ten years, there have been more extensive discussions of quality program pedagogy. Larimore (2019) describes an emergent and purposeful pedagogical model where students spend at least a third of their time outdoors. Teachers of nature-based schools employ play-centric styles of early childhood education infused with environmental stewardship, an interdisciplinary approach, and a strong psychological and theoretical framework based in the physical, social, emotional, and cognitive developmental benefits of nature for early childhood students (Cree & Robb, 2021; NAAEE, 2016; Sobel, 2015).

Very little literature exists exploring strong teacher preparation program elements to prepare candidates for nature-based settings or nature-based learning and there is a deficit in the research understanding the elements that could assist with providing quality teachers for these specialized early childhood programs. Born (2021) surveyed programs in an attempt to identify sources of training and development for nature-based teachers. The survey provided awareness that program elements and the value to develop programs for nature-based education vary greatly from state to state and institution to institution. As an example, a review of the standards for early childhood in the state where the research took place (Pennsylvania) revealed significant references to ecological nature topics and encouragement for nature observations in the early childhood standards, but there was very little guidance on *how* those topics should be taught (Office of Child Development and Early Learning, 2014, 2016). When comparing the early learning standards to the early childhood program framework required for teacher preparation programs (2016), evidence shows that the framework also includes specific language requiring that programs prepare candidates with knowledge of ecological early childhood standards. Again, there is no specific guidance for strong ecological teaching practices recommended in the framework. Best practices for introducing candidates to quality ecological and nature learning is left up to the individual program and professionals who teach in each institution. In the United States, individual state departments of education determine standards for early learning as well as the frameworks for teacher preparation programs which are likely a major source of the variance between preparation programs.

Purpose

With the steady growth of nature-based educational programming (at preschools and forest schools) and outdoor educational initiatives (at nature reserves, national and public parks, museums, etc.) further research is needed to determine how nature-based or environmental education program components or field sites may contribute to the

overall development of teacher candidates and their readiness to teach in specialized nature settings. This study aimed to examine how teacher candidates in an upper-level early childhood field course developed through the integration of programming in a nature reserve field site. The researcher was concerned with finding any patterns among participants to help identify what unique outcomes might occur through participation in a field experience specifically structured to be outdoors and focused on nature-based learning. Of additional interest was how candidates changed any definitions or developed skills after learning more about nature-based learning while participating at the nature reserve site. Also of concern were their individual perceptions of the value of educating children in nature and how it might have contributed to their overall teacher development following their participation in the nature reserve field opportunity. Therefore, this qualitative research focused on the following research questions:

1. How do early childhood teacher candidates' definitions of nature-based education change after participating in a nature reserve field placement program as part of an upper-level field placement?
2. What patterns of skill development exist among candidates who participate in a nature reserve field placement?
3. How do the attitudes of candidates change through participation in a nature-based learning field component?

Examining the perceptions of the teacher candidates within the unique partnership between the teacher preparation program and the nature reserve site was most conducive to qualitative design using focus group interviews. Interviewing the candidates was distinguished as the appropriate means of inquiry as cited in Creswell and Poth (2025). Brinkmann and Kvale (2015) describe interviewing as an attempt "to understand the work from the subjects' point of view, to unfold the meaning of their experiences, to uncover their lived world" (p.3). Understanding candidates' perceptions of nature-based learning therefore could help the research understand the impact of participating in a nature-based learning program.

Research Setting

This study took place in an upper-level field course at a small liberal arts college in Pennsylvania. The college maintains an ongoing partnership with a nature reserve site within a short distance from the campus. The college education department offers early childhood (Pre-K -4) certification as well as various subject-specific certifications in the middle grades (4-8), secondary grades (7-12), and additional K-12 certification areas including physical education, art, and Spanish. The nature enrichment program where this research was conducted was planned as part of an upper-level field course for early childhood teacher candidates. The course is offered each semester, but a registration cap is set at 10-11 teacher candidates to allow for small class size and close supervision of candidates' experiences by the professor of record. Enrollment varies by semester and is not cohort-based. The main goal of the course is to give early childhood candidates strong experiences with preschool-aged children in both a traditional school and a separate, nature-reserve environment. The preschool-aged nature enrichment program that the teacher candidates run is a free public program the reserve and field instructor initially started as an alternative field experience opportunity for candidates when the COVID-19 pandemic closed schools in the area. The nature enrichment program allowed early childhood teacher candidates to work with preschool-aged students in an outdoor and less transmissible environment. When COVID-19 restrictions were lifted, the nature enrichment program continued and became a coexisting opportunity to the traditional classroom field placement which existed prior to pandemic restrictions.

Course Structure

The course where the study was situated is an upper-level early childhood field course that takes place during a semester in a teacher candidate's junior or senior year. The course precedes the 5-day-a-week student teaching experience by 1-3 semesters and is required of any candidate seeking Early Childhood (Pre-K-4) certification. The course is taken after the teacher candidate has taken two or more subject-specific pedagogical methods courses (i.e., the teaching of reading, mathematics, science, etc.). The upper-level field class is a 15-week course that meets 1 day a week for three hours. Students spend approximately 6-7 visits at the school site placement which is a

preschool class located within an elementary school a short driving distance from the campus. No data was collected from the school-based portion of the course because of its lack of components related to nature-based learning. Data was only collected based on the 5-week placement in the nature reserve field site. The first week at the nature reserve served as an orientation to the facilities and programming of the site as well as an overview of nature-based learning initiative characteristics. During the other four visits, candidates conducted hour-long family nature-based learning activities open to approximately 20-30 registered preschoolers between the ages of three and five years old and their supervising adult(s). Once registration capped for the program, a waitlist was generated. Twenty to thirty children registered and could potentially attend all four weeks of the program. If there was a parent call-off because a child was ill or unable to attend, then a person on the waitlist was invited to participate in their absence. While many children participated every week of the program, others were invited to "fill in" when one of the registered participants reported off.

Program Structure

Program registration was offered via social media link for no fee. Registration was required to keep student numbers manageable for the number of teacher candidates enrolled in the course that semester. The program had weekly themes selected by the reserve's Environmental Education Coordinator and usually were representative of seasonal thematic topics that could be explored at the site (i.e., pollinators, hibernation, seeds, nests, etc.).

The program format included a thematic environmental children's literature read-aloud. After the read-aloud, preschoolers and their supervising adult(s) broke into groups and rotated through four, 10-minute stations connected to the nature theme. Stations were brief and varied for student attention and interest. Supervising adults interacted with their students in various ways. Some adults chose to participate alongside their child while others stayed back and allowed the child to participate independently. The stations were given categories to allow students to keep them separate and individualized. Categories of stations include art, music and movement, outdoor, and wild card stations. Station one, Art, included a creative art activity. The expectation set during orientation was that candidates must use natural and/or recycled materials as much as possible with emphasis placed on the center having an environmental purpose (i.e., insect hotel, backyard nesting ball, etc.). The second station, Music and Movement, was focused on teaching environmental concepts through song, dance, exercise, obstacle course, group movement task or other similar activity (i.e., bird yoga, pollinator song and dance, group task to build a large insect, etc.). Station 3, Outdoor Station, involved (as the name implies) an outdoor activity and unstructured exposure to nature. The outdoor station often included a walk to explore or complete an activity in a specific area of the reserve such as the pond, wetlands, butterfly garden, or other site that connected to the literature-based theme. Station four, Wild Card, was a free-choice station that was structurally different from the other three. Teacher candidates received the opportunity to be creative to contrast their peers' stations. This station commonly included a game, STEM activity, experiment, or other activity unique from the other three stations.

Teacher candidates received station rotation assignments during orientation week and had the opportunity for mentored and coached planning with access to the nature reserve's library of resources. Knowledge and experience with nature and environmental content varied per participant so candidates were supported as requested and offered models and suggestions if there was a struggle to choose a learning activity for a station. Teacher candidates submitted station lesson plans to the professor via a learning management system five days before the station was taught. Initial feedback was given by both the professor from the education department as well as the Environmental Education Coordinator from the reserve three days before the lesson was taught. The candidates made final station adjustments based on feedback and prepared for student materials prior to the program date. Following the program, feedback was given within one week. The structure of the course was scheduled so that the next session occurred at least two weeks later to allow time for response to feedback. In the "off" weeks of the planning/teaching cycle, the students were individually responsible for planning lessons for their assigned groups of learners at their school-based site.

Program Limitations

The program that was used for this research had characteristics that could be considered limitations or challenges for the study of how teacher candidates develop concepts in a nature field site. It was important to identify these factors so that the researcher could be cognizant of how the limitations might intervene with the participants' experiences in the program. First, it is recognized that the nature enrichment program design only covers a short time of the field course and does not meet full criteria of a nature-based program as defined by Larimore (2019). The structured environmental program contained some emergent and discovery elements held outdoors in nature where students could explore a site and interact with the candidates, but it also contained more structured environmental education activities which mirrored lessons from more traditional early childhood settings and public educational programming. Since Larimore (2019) describes that programs shifting toward nature-based education often exist on a spectrum of implementation, the enrichment program was still used to provide a basic introduction to principles of learning in nature to expose candidates to this mindset even though the program does not meet the full definition of a nature-based early childhood education program. The program did contain consistent infusion of natural materials when building and crafting, outdoor observation opportunities, nature play at reserve locations (gardens, ponds, bird stations, trails, etc.) exploration of nature materials when indoors (specimens of nest, hives, persevered animals, and interaction with live animal ambassadors) to lay the foundation for candidates to understand basic ways to infuse nature-based learning and environmental stewardship into early childhood teaching (Powers & Ridge, 2019).

A second program limitation included the location and existing partnerships with the reserve. Because of the close and multifaceted partnership between the reserve and the college, the candidates may have had exposure volunteering or working at the reserve prior to the study. A pre/post reflection was used to establish current levels of knowledge and past experiences with nature. Defining these past experiences allowed the researcher to identify prior knowledge and how that knowledge might have changed by the end of the field experience. This research was a small qualitative study, and the ideas of the study will only be transferable to other programs of similar size, function, and design. Because there are only small amounts of research about a nature field site used in teacher preparation, the study still potentially offers valuable information about how candidates develop in a nature field site.

Methodology

Prior to conducting any research, the methodological procedures for this study were approved by the Institutional Review Board (IRB) at the college where the research took place. Qualitative research was the most appropriate form of research for the study. Qualitative research is most suited when endeavoring to "study things in their natural settings, attempting to make sense of or interpret phenomena in terms of the meanings people bring to them" (Denzin & Lincoln, 2018, p. 10).

Participants

There were 11 teacher candidates enrolled in the course during the academic year when the study was completed. Four teacher candidates were enrolled during the fall semester, and seven teacher candidates were enrolled during the spring semester. Of the 11 potential teacher candidates who took the course, four candidates elected to participate in the study (two spring, two fall). All participants were either juniors or seniors and in their 20s. All participants were majoring in early childhood education (grades PreK-4). The candidates who participated were a mixture of both male and female. Exact ratios of male to female participants are omitted to protect the identities of the male participants since the early childhood program at the college experiences disproportionate numbers of male and female candidates. All participants were seeking their initial certifications. Two of the participants were also seeking dual certification in special education (K-12). The course where the field experience took place is designated as a student's third of five specific field courses (Field I-Field V). The field courses are designed to be taken individually, but in unique cases, a student may be registered for two adjacent field classes at the same time due to scheduling hardships. This co-registration scenario happened with one participant who was taking both the

third field course at the same time as the fourth field course. The fourth field course is designated as pre-student teaching—a 7.5 hour-a-day, 1 day-a- week, 15-week field placement course.

Course Procedures

The field experience was planned as a part of a one-credit undergraduate field course required of all early childhood candidates at the college. It is a part of a regiment of field courses which range from basic observations and novice, small-group, teaching tasks (Field I) to full-time student teaching (Field V). The course has both a school-based component at an elementary school and the nature reserve component. The researcher was the professor of record for the academic year that the study took place. Because the researcher was the professor of record, special attention was paid toward sources of bias when conducting the course and data collection procedures. To account for this bias, the value or quality of the specific program elements was not the emphasis of the study. The type of program was not viewed as an intervention or specific format for teaching nature-based education initiatives to candidates. Rather, the participants' thoughts and reflections were the focus of the data. While the structure of the program is pertinent to help bound the program and site used in the study, it is acknowledged that there are many formats, programs, and opportunities where candidates could participate in nature-based learning. The sources of data that were used from the program/course are a regular part of the course routines.

At the time when the program was conducted, teacher candidates were not aware that the professor would ask them to participate in a study at the end of the semester. The informed consent and focus group interview invitation was sent following the grade deadline for the college to ensure that students could participate/or not participate without fear that their grades could be affected. The informed consent asked permission for class assignments to be used as a source of data. Since the researcher was the professor of record, the assignments from all participants who gave consent were downloaded from the learning management system and printed as a paper record.

Field Procedures

The field experience at the nature reserve was constructed to be five (5) weeks of the 15-week field course. The first week of class, candidates were notified that they would be participating in a field experience at the site during a general orientation to the field course. Basic information about the program was explained, but limited to the location of the site, recommendations for options of how to travel to the site as well as a general introduction to themes that would be used for the weekly courses. The pre-reflection was assigned at the first class meeting so that students' background knowledge and questions could be used to plan an orientation about the nature reserve.

Pre-reflection. Very little information about the mission of the nature reserve or the different components and structures of the program were given initially to allow candidates the opportunity to report their prior knowledge of nature-based learning accurately without influence. Pre-reflections were reviewed by the professor of record and the Environmental Education Coordinator from the field site to plan an orientation session to the program. Students were given an assignment sheet with open-ended questions to prompt them in reflecting on past experiences with nature. The following are the questions that were included on the pre-reflection assignment sheet. Students were permitted to add additional thoughts or to not answer specific questions based on their preferences.

Pre-reflection assignment prompts included:

1. How do you currently define nature-based education? Prior to this course, have you ever volunteered, worked, or observed in a nature-based educational situation? Please provide details

2. What are the most significant field experiences you have had leading up to this course? What do you believe made them so significant to your current teaching style or development?

3. How confident would you label yourself as a teacher of content knowledge about nature or the environment?

4. Did you ever participate in educational activities in nature as a child (i.e Camps, field trips, family travel, organizations that promoted time in nature, etc.)?

5. What are your current career goals as a teacher candidate? Does integrating nature into education play any part in these goals? Feel free to be honest.

6. What questions do you currently have about nature-based education?

7. Do you have any expectations for the orientation or ideas of what you would like to see/do at orientation to become more familiar with the site or to support you in providing strong educational experiences?

Nature Orientation. *A*fter the pre-reflection was due and an orientation constructed, the students participated in the orientation to the nature reserve and its nature enrichment programming. The orientation included an introduction to nature-based learning and a review of the site's mission, programs, and resources. The orientation also included a tour of the different animal ambassador stations and locations to explore on the reserve. Candidates were introduced to the themes and matching literature selections. They were assigned one of the four possible stations for the first week (outdoor, music and movement, art, or wild card station). Purposeful time was left open at the end of the orientation to allow candidates time to answer questions and access the resource library at the reserve. Each week the candidates would plan a different ten-minute, station lesson to work with the group of children registered to attend. Candidates were encouraged to get feedback by emailing the professor of record or the environmental education coordinator before constructing a lesson plan.

Teacher Feedback/Teaching in Nature. Once the initial lesson plans were submitted, the Environmental Education Coordinator and the professor of record worked together to review the plans and provide feedback. Revisions were completed if needed. If a revision occurred, it was most often related to aligning to the program expectations (i.e., using natural materials, having environmental purposes for activities, etc.). Other minor adjustment included management of supplies, management of students, or movement of groups between stations. This rotation occurred each week for the three remaining weeks of the program. Each week of the course had a different nature theme and each week, teacher candidates would be responsible for a different station. In the fall, each of the four enrolled candidates had a chance to run each station once. In the spring semester, candidates were assigned a team-teaching partnership due to higher enrollment. There was one teacher candidate who volunteered to work alone. Again, each candidate team had an opportunity to plan and teach each station once during the 4-week program rotation.

Post-reflection. Following the final program session, the candidates were assigned a post-reflection narrative to allow them to reflect on how participating affected them. The assignment was given immediately following the completion of the 4^{th} week of the preschool nature enrichment program. The assignment sheet was again constructed to have prompting questions for candidates to answer but was a flexible assignment. Candidates were free to identify any information they did/did not want to write about.

Post-reflection assignment prompts included:

1. How do you currently define nature-based education? Has that definition changed since the beginning of the semester?

2. How did this experience align with or differ from past experiences you had in nature prior to this semester?

3. Using the subdomains of Danielson (2022), what domains were you able to grow in or practice during this specific field placement?

4. What are the most significant experiences you had during this placement? What were you most confident in teaching?

5. How confident would you label yourself as a teacher of content knowledge about nature or the environment?

6. Following this nature placement, does nature-based education play any future role in your teaching? Would you consider implementing a nature-based curriculum or experiences into your future practice? How confident would you feel?

7. What questions do you currently have about nature-based education?

8. What recommendations do you have for the professor about this experience in the future?

Focus Group Interviews. Following the grade deadline in the spring and fall semesters, candidates were sent an informed consent which asked them to participate in the study by joining in a focus group interview and allowing the professor to pull their pre- and post-reflections and lessons from their semester of participation in the nature enrichment program. Candidates sent an email indicating an affirmative response to participate. Negative response emails or no email responses were both considered as nonparticipants whose artifacts were not included with the recorded data. Interviews were held online at a time convenient for all participants for that semester (arranged by email). Prior to the interview the candidates were sent the focus group interview procedures and questions for review. Like the pre- and post-reflections, candidates were notified that they were free to speak candidly and add additional comments that did not pertain to the questions to encourage candid speech.

Possible Focus Group Question for Discussion:

1 How has your definition of nature-based education changed (or not changed) since the beginning of the semester? What led to this change (or lack of change)?
2) What benefits did you experience from participating in a nature field experience?
3) Were there characteristics of the experiences that you believed were not beneficial to your development?
4) How did this experience compare to other field experiences you have experienced in more traditional settings?
5) What specific teaching skill domains (planning and preparation, classroom environment, instruction, professional responsibilities) did you utilize most while participating in this placement?
6) What skills, if any, did you believe grew as a part of participating in this placement?
7) Of the teaching skills that you utilized were there ones you believe you could/could not transfer to other field placements?
8) Has participating in a nature early childhood field experience changed how you plan to teach?
9) What importance do you place on nature field experiences being included in early childhood teacher preparation programs?
10) What importance do you place on nature-based education placements for early childhood students?

[Note: Participants were welcome to discuss any issue or topic related to the study not included on this list during the focus group Zoom meeting.]

Both sets of participants completed their interviews a few weeks after each semester was over to allow some separation between when the program ended, when the post-reflection was completed, and when the interview was conducted. All interviews were completed using video conferencing software (Zoom) and were recorded for the purpose of creating an interview transcript for data. To transcribe the participants' responses a cell phone with a Google Doc application with dictation feature was used to record each response initially. An inclusive timestamp was recorded for a response, and a color of font assigned for each different participant. After using the dictation feature to initially record the response, the researcher would then review (several times) each specific response by its inclusive time stamps and make corrections to the dictation of the response so that it reflected the exact words of the participant. This process was repeated until a transcript of the interviews was finalized for each semester. Then, each video was reviewed in its entirety with the finalized script to ensure accuracy of the data overall.

Data Collection

There were two main sources of data for this study. The first source of data came from document analysis of the pre-reflections and post-reflections of the participants. Pre/post reflection data were chosen because of the opportunity to document prior knowledge of the participant before participating at the nature reserve site and the opportunity to conceptualize growth or change after completing the nature reserve field placement. These reflections were completed in the participants' free time outside of class using a semi-structured format that allowed them to choose questions to answer (questions described in pre-reflection and post-reflection sections), but participants were also offered flexibility to discuss any additional thoughts or opinions they wished to share. These reflections (as described in the methodology) were also used to help plan orientation experiences at the nature reserve so that the orientation presentation might address differences in nature-based learning methods and answer questions/concerns of the teacher candidates before they were expected to teach independently in the program. Understanding the ideas and reflections of a participant both before and after program participation helped to develop descriptive context for what participants experienced during program participation.

The second source of data for this study came from the participant responses during the focus group interviews following each semester's end. These interviews were used to allow the participants both space and time from the completion of the program to support that a candidate might be more willing to speak freely about their reflections of the experience. A permissive environment was cultivated to reassure the participants that they could speak freely and offer opinions about the experience without the researcher being affected. They were reassured that the specific quality of the program was not being researched and that the main concern was their beliefs and perceptions of having a nature reserve site as part of a field experience. As a part of the informed consent, additional artifacts obtained included lesson plans and feedback in case of a need to provide context of the candidate's lessons and activities as reported in their post-reflection or their focus group interview responses.

Data Analysis

Data analysis procedures for the qualitative case study were determined using procedures and recommendations for qualitative data analysis from Merriam and Tisdell's (2016) book on the design and analysis of qualitative research. The authors describe data analysis as a simultaneous event with data collection. Thus, conceptualization of the data patterns began to faintly take shape with the turning in of the pre-reflection documents and the planning of orientation. The initial review of the pre-reflections helped to shape course experiences and helped to identify patterns in prior experience among candidates in the course. Only the data of consenting participants is included with this analysis. Despite this, the non-participant candidates' reflections had impact on the structure of the orientation and the experiences in the course.

Once consent was obtained following the grade deadline, the researcher first reviewed a candidate's individual data to identify unique features of each person's experience within the course. Notes were made to identify those unique features. Each participant's data was then examined based on individual types of artifacts to identify possible consistent patterns or themes among the participants' experiences. For example, all pre-reflections were compared for patterns, all the post reflections were compared for patterns, etc. Participants were assigned a number disregarding if they took the course in the spring or fall semester. Because the data were multifaceted based on each person's unique experience and because participants had the choice of what to focus on in interviews and reflections, the decision was made to focus on thematic categories that were consistently comparable between all participants. In some cases, individuals reported on a topic that others did not. For example. In the post-reflection, not all participants made recommendations to the professor about the nature-site field component. One student mentioned not having partners in future courses, while another one made a recommendation of the setup of the school calendar for the traditional and nature sites. There was not enough consistency between answers to visualize and compare them. These types of responses were not disregarded, but because they were not the focus of the research questions, they are not the main focus of the discussion.

The following thematic categories were present and comparable in each participant's data:

1. Pre-definitions and post-definitions
2. Prior nature experience
3. Skills utilized
4. Value of nature field for candidates
5. Value of nature-based education for students

Once the common thematic categories among participants were identified, pre-reflections, post-reflections and focus group interview scripts were read multiple times to identify the similarities and differences among participants in these categories. Categories were given a color code and kept consistent among each thematic category for all sources. The data from each category were then used to visualize and identify findings that matched the themes of the research questions (definitions, skills, attitudes). Using the data that was common among participants and classifying them back to the research questions allowed for better reduction of the data for significance. It was helpful to create graphic organizers to better compare the common responses in some categories.

Results

The results of each of the common thematic categories are assembled in this section. The significance of these data to the research questions are explained in the discussion section.

Pre-Definitions

All participants provided a basic definition that showed some awareness and pre-knowledge of nature-based educational settings and nature being used as a tool for learning. Table 1 is a visualization of the features of each candidate's pre-reflection definition as evidenced by representative quotations from their responses. If a section of the table is blank, that participant did not provide a quote that supported nor negated the definition features other participants used. Three of the responses included common knowledge that the learning in nature-based education must take place in nature. There were also four responses that addressed learning being hands-on and experimental in nature. Participant 1 also had unique knowledge that it was important for nature-based education to have real world applications.

Post-Definitions

After participation in the program, all participants re-addressed their current definitions of nature-based education as part of the data. Three of the four participants believed that their definition had expanded. One participant, Participant 2, believed that their definition had not changed but through the data had shown some consistent discussion features with the other participants who believed their knowledge had expanded. It is pertinent to mention that participant 2 had prior experiences volunteering before their enrollment in the course.

Features of the expanded definitions included more candidates speaking about quotes that supported the idea that there are real-world applications to nature-based education. There was also supporting evidence of quotes from participants' values about environmental education/global citizenship as well as the connection of natural curiosity and the exploration of nature to early childhood developmentally appropriate practice. Table 2 is a visualization of the common characteristics among participants' post-program definitions with representative quotes coded as those ideas.

Table 1. Visualization of the common characteristics among participants' pre-program definitions of nature-based education.

Definition Feature	Participant 1	Participant 2	Participant 3	Participant 4
Setting	"Basing learning in nature"	"Education that takes place in nature"	"form of learning that occurs in an environment surrounding nature"	
Nature as a learning tool	"This does not simply mean using objects in nature as tools, such as using leaves to count. Rather, it involves basing learning in nature, with real-world applications and connections."	"Education about nature"	"It must be hands on and related to the outdoors."	"formal and informal instruction that uses different elements of nature"

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Table 2. Visualization of the common characteristics among participants' post-program definition of nature-based education.

Definition Feature	Participant 1	Participant 2	Participant 3	Participant 4
Setting (and expanded setting)	"I don't know if my definition changed as much as it expanded or just added onto. Before my definition was very limited. It was strictly just learning outside in nature." "Now I think it's a lot broader and more universal."	"Education that takes place in nature" *stayed the same from pre-definition.	"a type of learning that occurs in an outdoor or environmental setting" *stayed the same from pre-definition.	"I thought (nature-based learning) had to be learning science outside focusing mainly on the science aspects of nature. But a lot of the instruction was integrated. There was music, movement, physical activity and even reading connections to the learning."
Definition Feature	**Participant 1**	**Participant 2**	**Participant 3**	**Participant 4**
Nature as a learning tool	"Nature-based education can involve nature-based materials or settings of nature to support the reaching of instructional goals."	"Education about nature" *Stayed the same from pre-definition.	"Not that I didn't know this already, but the importance of interactive nature activities. I think you can easily see it with all of our lessons."	"formal and informal instruction that uses different elements of nature" * Stayed the same from pre-definition.
Real-World Application	* Participant did not specifically make a post-	"It is important for students to know about the world	"It is not just an outlet to teach	"I can see future educators finding resources in their

	program quote that matched the real-world application that was mentioned in his/her pre-reflection.	around them, even with things they might not observe directly in their backyard."	(traditional) subjects outdoors." "…what we were teaching teaches them about the world around them…(described a story about observing pollinators at the reserve)…as citizens it's important to protect those species and realize they are important.	own communities to get student outside and to get them involved."
Definition Feature	**Participant 1**	**Participant 2**	**Participant 3**	**Participant 4**
Internalized Values of Nature for Early Childhood Development	"(in nature) There's endless opportunity for learning and for imaginative play…which is the primary way that early childhood students learn."	"I will keep in mind how much children like being outdoors and enjoy exploring and hands-on nature types of things."	"It (the placement) showed us the importance of nature-based learning in a child's development."	"I can see how anything like that (the placement) has them not just sitting. They are moving and around and doing all these (nature) things. They are not inside hitting the books."

Prior Nature Experience

In the data, the participants all had some prior experience with nature that could be classified as positive. Participants all reported remembering moments from nature experiences and described specific examples with varying levels of fondness. Participant 1 described playing in nature as a child and questioning the word around them (playing pretend as if stranded on an island, wondering why fireflies were able to glow). They also recalled raising strawberries in their yard and a love for being outside and exploring. Participant 2 mentioned participating in a scouting organization but felt that outdoor time was minimalized to a few camping trips and mostly indoor activities. The majority of Participant 2's prior experience came from opportunities to volunteer at the nature reserve where the study was conducted prior to participation in the field course. Participant 3 also mentioned scouting as their connection with nature as a child where they had achieved a top level of scouting and reported significant time outside learning while in the scouting organization. Those experiences also made Participant 3 feel confident in nature with a belief that their connection with scouting would be an asset when participating in the field site. Participant 4 described significant nature-based field trips to a waterway local to their community. They recalled learning about water health and oyster populations that were indigenous, but often overfished, in that body of water. Participant 4 also described a close familial connection who works as an environmental scientist. That connection allowed Participant 4 to also have some respect and connection with nature. These data are important to shape the context of the study because all four willing participants had some prior positive experience toward nature before enrolling the field course. It is a possible bias to be cognizant of since pre-existing concepts of nature may have influenced desire to participate in a study of a nature reserve field site. More research is needed to identify complex factors and the characteristics of candidates who choose to work in nature-based environments and how much teachers who work in nature might be influenced by attitudes toward and prior experiences with nature.

Skills Utilized

Participants reported on skill areas they believed they grew up in or practiced as a part of the nature reserve field experience. Evidence in both sources of data produced several transferable teaching skills. In several instances, candidates spoke of their skills utilized in the terminology of Charlotte Danielson's *Framework for Teaching (2022)* as it is a common tool used by the teacher preparation program in which all the students are enrolled. The framework is consistently reviewed in other field experiences at the college, so participants often use the language of this framework frequently and consistently when describing their teaching practices. Several candidates also discussed skills they believed were/were not transferable to other field placements. These data were collected to ascertain a context for the retained skill development of the candidates to help understand more about how the participants perceive if skills could transfer to future placements or careers.

All four participants possessed data that mentioned planning and preparation as a domain of skills that the nature field experience allowed them to practice. The first two participants only made general reference to subsets of planning and preparation (i.e. gained knowledge of students). Participant 3 spoke in detail about a scenario where they had to become an expert on worms for a weekly theme while Participant 4 quoted, "I used planning and preparation a significant amount of the time. With the weekly lesson plans and networking with the environmental coordinator, I got lots of feedback and would get the opportunity to make it (the lessons) better." Three of the participants described skills practiced within the context of fostering a quality learning environment. Participant 1 mentioned practicing skills where they had to create a culture for learning while teaching outdoors. Participant 3 spoke of the challenges practiced with working in an "interactive environment" for preschoolers. Participant 4 described the challenges of "exercising their classroom management" in a less structured outdoor setting. For instruction, Participant 1 provided additional details of the challenges of maintaining flexible and focused engagement of learning in a nature setting, while Participant 3 described strategies for asking questions and guiding students without giving too much information away. Finally in the domain of professionalism, Participant 3 was the only participant to mention getting the opportunity to practice reflective teaching with their partner as a part of the placement.

Value of Nature Field for Teacher Candidates

In the focus group interview sessions, participants were asked specifically what value they placed on a nature field experience for teacher candidates. They were also asked if there were things they believed were/were not beneficial during their participation in the nature reserve field placement.

For the question which focused on the value that the participants placed on the inclusion of a nature experience in teacher preparation programs, all four participants offered opinions. Participant 1 discussed the broadening of their definition of what education could be:

> *I grew up in the American education system. You come to school. You get a paper, pencil, and worksheet. You sit down and you learn. The placement really opened my eyes to how beneficial nature-based experiences are in terms of learning. You really saw the hands-on, the constructivism, and those aspects we learned in child development and psychology.*

Participant 3's thoughts focused on the idea of nature-based educational experiences being beneficial for teacher education in that they provide a wider view of the early childhood options available. "It's a different style of (early childhood) teaching. Right now, our program is very focused on classroom teaching. It's very helpful to see another side of (early childhood) education. Participant 1 expanded on the idea that a nature field placement expanded their ideas of the jobs that a teacher could be eligible to do. "I think, for me, it (the benefit) was kind of seeing more of a variety of ways you can apply education and teaching to different settings." Participant 4 had similar opinions about widening job opportunities, specifically noting that the Environmental Education Coordinator at the research site was also trained as a teacher. "I really enjoyed her (the Environmental Education Coordinator's) job. It was nice to see there are so many different routes we can take."

Participants were also asked to elaborate on any skills from the experience that were transferrable to their future career or other placements to identify the value participants placed on having an experience in a nature reserve setting. Participants 1 and 4 both mentioned the awareness of the challenges of a multi-age group and finding activities that were appropriate for the differences between 3- and 5-year-olds. Participant 1 believed that the "open air" setting provided challenges in classroom management that helped them become better at managing a large group with potential for distractions. Participant 2 described the transferability of more minor management strategies that were observed at the site, specifically, a strategy for completing a project where stages of the project were chunked and pictured step-by-step to help children complete the project independently.

Value of Nature-Based Education for Students

By the end of the experience in a nature setting, participants reported awareness and potential benefits to children learning in nature. During the focus group interviews the participants' conversations focused on two different aspects of potential benefits. Participants 1, 2 and 4 concentrated on the potential developmental health benefits of nature settings as an opportunity for children to move more, explore more, and engage curiosity. Participant 2 specifically mentioned valuing the benefit of an outdoor space. "I think it's important for them (students) to have that outdoor space. At my house, we don't have a yard, so I think it's important for all children to get that opportunity to go outside." Participant 3 mentioned their perceptions of the importance of teaching students about the world around them. When asked if they placed importance on nature-based education opportunities for teaching early childhood students, Participant 3 also described valuing teaching students to be active citizens in their environments. "They (the preschool students) got to learn about bees and butterflies…as citizens it's important to protect those species and realize that they are important in our world." There are several limitations of this study including effects of small participant number, interview question design, and lack of long-term data. In the case of the effects of small participant numbers, the study was constrained to the number of available enrolled candidates. While this study has offered insights to the perceptions of early childhood teacher candidates participating in a nature field placement site, it is only a tiny picture of one small enrichment program in a much larger pool and spectrum of nature-based educational program settings (nature-based schools, forest schools, etc.).

There are also questions to consider related to the participants' prior positive experiences with nature. The participants all had some prior positive experience with nature which could have skewed their perceptions of a nature field placement to focus more on positive attributes and less on negative attributes. In addition, the researcher does not consistently teach the course in all semesters, so the pool of participants was limited to the enrollment for the year in which the course was taught. This factor also affected the interview question design. Because the research time was limited to while the researcher was the professor of record, there was no additional time to do a pilot with the focus group interview questions.

While the researcher wanted to know more about any possible benefits to utilizing such a field placement in a teacher education program for early childhood educators, the study does not provide significant opportunity for transferability to other types of nature programs unless they are of similar structure, function, or design. This research also does not (yet) provide long-term data of the outcomes of the participants to see if there is any correlation between participating in a nature field placement and the likelihood of choosing a nature-based educational setting later in one's career.

Several steps were taken during data collection and analysis to ensure the integrity of the researcher and the data. First, because there were multiple sources of data between the interviews and the pre-post reflections, triangulation of data was completed during analysis to ensure that thematic patterns were consistent among data sources. During the interview proceedings an audio recording of the data provided opportunity for data to be recorded explicitly. Following responses, the researcher probed and clarified individual's responses to verify correct interpretation of the data transcript to maintain data accuracy.

Discussion

Data in this study provided detailed insight to the ideas and beliefs of the small group of candidates who participated in a nature reserve field placement setting. While the participant group was small, the research that exists about quality program elements for preparing teachers for nature-based environments is limited, meaning that this study still provides a needed contribution in the deficit of this specific type of research. Implications for the data in relation to the initial research questions provide some valuable interpretations.

For the first research question, data indicated that all participants in the group had some prior knowledge of the definition of nature-based education prior to participating in the field placement. It is uncertain whether this is due to current programming elements/nature-based education's presence in the research for best practices in early childhood education, or due to the long-term educational programming partnership that exists between the nature reserve and the college where the participants attend. The initial definitions of three of the participants matched well with the more universal definition provided by Meier & Sisk-Hilton (2013) and Prochner (2021), but candidates' definitions did not include the element of "regular opportunities to interact with nature." One participant did recognize that real-world connections might be valued in such placements, but otherwise no other sophisticated knowledge of best practices in nature-based education were present. Evidence was provided that most participants demonstrated expanded definitions that were more detailed after participating in the field placement in nature. Expanded definitions included awareness of more specific benefits for students including health factors, developmental factors, and expanded ecological knowledge.

For the second research question, responses in interviews and reflections provided the opportunity to examine skills participants perceived they practiced in a nature field placement. The most common responses among participants involved opportunities to practice skills in planning and preparation of lessons. Participants all described at least one characteristic from this domain with the majority of supporting information relating to the challenges of planning content and choosing developmentally appropriate activities for students. The second most popular domain among participants was the domain which addresses creating strong learning environments. Three participants believed they met challenges or grew in that area. Specifically, two participants cited practice and growth related to maintaining interactive engagement and classroom management while in nature while one participant specifically mentioned creating a nature learning culture. In the domain of instruction, a participant specifically mentioned skills for maintaining a focused environment in nature and another mentioned crafting quality questions as areas of practice. Finally, one participant believed they practiced reflective teaching while networking with a partner. While the placement was an informal field setting it was encouraging to see that participants perceived growth in teaching skills that were transferrable to other placements and environments. All the participants reported taking away some transferable skills, even if their future career plans did not include a nature-based setting. Participant 1 noted that they believed not all content was transferable (told a specific story about not believing they would ever teach owl talons in their future career) but noted that they would remember how much the students enjoyed seeing the hands-on example of the owl. During the focus group interviews, several participants noted that participating in the placement expanded their knowledge of differences in early childhood nature-based programming and broadened their awareness of nature schools and nature placements in public settings. These data indicate a connection to the need to raise additional awareness among teacher candidates that nature-based teaching is a specific and sophisticated set of pedagogies that have application in both school settings and public nature settings. As the program grows, it could benefit from continued implementation of initiatives focused on contemporary definitions of nature-based early childhood education to build candidate exposure to these best-practice programs. While some elements possessed characteristics of nature-based learning the program did not have access to a contemporary nature-based school.

Finally, in the third research question, there are implications in the data regarding participants' attitudes through participation in a nature-based field setting. All four participants discussed valuing a nature-based field placement for teacher candidates and reported valuing the developmental benefits of nature-based learning for early childhood students. Overall, it is uncertain whether this can truly be viewed as an attitude change. The data does seem to indicate a more expanded knowledge about value and benefits of nature-based programming. Unfortunately, as discussed in the limitations section, all four participants had some positive experience toward nature-based learning

prior to participating in the nature field placement. This limitation made it impossible to definitively determine growth or changing attitude through the experience. Attitudes were already positive prior to the field placement. More research is needed to discern what dispositions of teacher candidates might influence a candidate to choose a career in nature-based education and if experience in a nature field placement might change or grow candidates' attitudes toward nature-based learning.

Conclusion

Despite the limitations, this research does provide some valuable contributions and insights into the possible impact of a nature field placement for early childhood candidates. The results of the research evidenced involvement in a nature field placement as having the potential to provide opportunities for expanding teacher candidates' definitions and knowledge of the characteristics of quality nature-based education programs and learning initiatives for early childhood students. Evidence also indicated that participants reported a better awareness of nature career options in both school-based and public-based settings. Collected data also showed perceived growth in the knowledge of the benefits of nature for early childhood students' development.

More research is needed to identify quality program components for developing teachers prepared for nature-based education settings and the impact of nature field placement settings for teacher candidates who are interested in careers in nature-based learning, especially if the nature program growth continues at the rate at which current literature suggests. There is also additional significant research needed to determine the dispositions and skills of nature-based teachers to ascertain if there are common characteristics which lead them to choose nature-based classrooms or public nature education programs in their careers. Creating highly qualified candidates who are prepared to teach in nature -based education and nature-based learning settings continues to be a valuable topic of research for early childhood teacher preparation.

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