

Young Children's Participation in a Nature-based Program: Impacts of NATURKIND Program on Young Children's Development

Ju hu Kim*, Mark Baldwin

Ajou University, Roger Tory Peterson Institute

Abstract

The purpose of this study was to evaluate a nature-based learning program for young children titled NaturKind. The main goal of the NaturKind program was to facilitate young children's active interaction with animals. Through the interactions, young children participating in the program are expected to develop skills in areas such as observation, peer collaboration, and communication. For the evaluation of program, 15 children were recruited from two preschools in U.S. Results indicate that children's comfort in interaction with animals, knowledge in animal care, motivation in learning, and social and emotional development increased significantly after participating in the program. Based upon the results of this study, implications and suggestions were made for the future of nature-based program for young children.¹⁾

Keywords: young children, nature-based program, social and emotional development

Nature-based learning in early childhood is an important component of healthy development for children (McHenry & Buerk, 2008). Through interacting with nature, young children can experience an appreciation of beauty, sense of wonder, and joyful inquiry (Wilson, 1993). Interaction with nature is not mere play or outdoor

* juhu@ajou.ac.kr

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activity that lack direction and purpose for young children. Rather, nature provides young learners with a good learning context and source for an inquiry-based learning environment (Nimmo & Hallett, 2008; Roger Tory Peterson Institute, 1991). Thus, nature-based education is not only learning about nature, but also learning through nature. Additionally, through these experiences, young children can develop positive environmental attitude that will last for their entire life (Louv, 2005; Stapp, 1978; Tilbury, 1994; Wilson, 1994, 1996). From these perspectives, the importance of development and dissemination of nature-based education in early childhood has been emphasized. Whereas a majority of studies in this area were oriented to conceptual and philosophical arguments, it is not easy to find empirical research evidences showing the effectiveness of nature-based learning programs for young children.

The main theoretical rationale behind nature-based learning in early childhood is that through interaction with nature, young children can construct understanding of the world by manipulating raw materials in nature (Wilson, 1996). Nature provides innumerable raw materials for young children's hands-on activities. The process of learning through physical experiences and hands-on manipulation has been recommended by many early childhood researchers (e.g., Kamii & DeVries, 1978; Bredekamp, 1987; Bredekamp & Copple, 1997). Through these hands-on experiences, nature-based learning offers the potential for a variety of benefits for young children's development.

Nature-based learning is also helpful for young children's affective development (Louv, 2005). Nature provides young children a context in which they can experience a sense of wonder and appreciation of beauty. This self-realization experience is not easily realized within regular classroom activities or other types of learning. Through observing, smelling, touching, and hearing, young children can develop their own aesthetics. Additionally, nature-based learning approaches have the potential of providing opportunities for young children to develop attachment with nature and positive environmental attitudes that will last for their entire lives. That is, adults who

had positive experiences with nature show positive attitudes toward environmental issues along with their active participations in the events regarding these issues (Tilbury, 1994).

Social development in early childhood also can be fostered through interaction with nature. In nature-based learning, especially in outdoor settings, children can learn how to collaborate with each other. For example, by interacting with and asking for help from others, young children can develop appropriate social adaptive skills (Wilson, 1995). By participating as a group in animal care or vegetable gardening, young children can develop their social skills and social adjustment.

Despite the potential advantage of nature-based education in early childhood, there has been little research evidence supporting the advantages and benefits of nature-based education. In fact, Several studies for nature-based learning in early childhood were published, but their interests were limited to conceptual or theoretical arguments (Louv, 2005; Kim & Lim, 2007; McHenry & Buerk, 2008; Wilson, 1996), practical suggestions for outdoor activities (Nimmo & Hallett; Wilson et. al., 1996), or guidelines for certain topics (Wilson, 1993, 1997). It is expected that adding some empirical evidence demonstrating the effectiveness of nature-based learning programs for young children would enrich the research regarding the issue overall. With this purpose, this paper thus reports the evaluation results of a nature-based program for young children titled NaturKind.

NaturKind: A Nature-based Learning Program for Young Children

The NaturKind program is a nature-based learning program for young children developed by the Roger Tory Peterson Institute of Natural History (RTPI), Jamestown, NY, in collaboration with Pacific Oaks Research Center, Pasadena, CA. The main goal of the NaturKind program is to facilitate early childhood teachers' abilities to provide nature-based learning opportunities for young children. It is theorized that children participating in the program would develop skills in the areas

such as observation, peer collaboration, and communication. Components of the NaturKind program provide opportunities for social and emotional development, in addition to cognitive development.

The program follows the theory of emergent curriculum (Booth, 1997; Dorl & Egan, 1999; Sheerer, 1996) in which the teacher carefully prepares the environment and observes how children interact with it. The teacher then supports and facilitates children's learning as it takes unexpected directions. For the children's interaction with animals, NaturKind teachers learn to use "mini-habitats" to nurture children's curiosity and affinity for nature. In a word, the use of mini-habitats provides simple, inexpensive ways to bring parts of the natural environment into the classroom.

The mini-habitats consist of small, easy-to-care-for animals such as land snails, tadpoles, earthworms, praying mantises, and ladybugs all of which are housed in simple containers. Young children are encouraged to look as well as to touch, smell, and manipulate the animals. If teachers can not prepare real animals, they also can develop animal sections with rubber or clay animals.

Children's active interaction with peers is usual through the program implementation process. When children observe snails, for instance, it is strongly encouraged for them to share animals for their play time. In addition, young children enjoy role plays with animals it is easy to observe young children's showing like "I am a big bird. I am flying!!!", "Are you a snail? I am a snake! I am going to eat you", "Now, it is your turn", "Thanks for your waiting", and so forth.

The book, *Snail Trails and Tadpole Tails* (Cohen & Tunick, 1993), serves as a guide for NaturKind participants and the manual for Naturkind workshops. The book enhances teachers' understanding of nature-based learning by giving a step-by-step account of two teacher's classroom learning experiences with animal visitors and pre-school children. Each chapter begins with a description of the habitat, an explanation of how to set it up, and a list of activities the teachers prepare to accompany it.

Early childhood centers and teachers who want to implement the NaturKind pro-

gram participate in a teacher workshop first. Arranged through the RTPI, workshops are held in schools, early childhood centers, and institutions of informal science education such as museums, zoos, botanical gardens, and nature centers. Workshop presenters are preschool teachers who have implemented the NaturKind program themselves. Their stories, demonstrations, and modeling of materials and techniques frequently build enthusiasm for nature study among teachers who have little or no science background. If teachers need more teaching materials or information resources, they can access RTPI or more experienced teachers. The staff of RTPI monitors program implementation and visits early childhood centers for continuous program modification and development. Through this process, more experienced teachers who are interested in leading NaturKind are selected and trained as teacher workshop leaders. Thus, NaturKind program itself is evolving through collaboration with early childhood centers and field teachers.

Method

Participants

The participants in the study were 15 children (female: 8; male: 7) from two preschools in a city located in an eastern state of U.S. From the two preschools, 25 children initially joined the evaluation study. However, 10 out of 25 children missed many sessions of evaluation data collection. So, evaluation data from the 15 children were utilized for the final analyses. The age of children ranged from 47 to 75 months with a mean age of 60 ($SD = 8.74$).

Instrumentation

Children's participation. The 12-item Children's Participation Scale was utilized to assess 3 factors of children's involvement in NatureKind program: Comfort in Interaction with Animals, Knowledge in Animal Care, and Motivation in Learning. The Comfort in Interaction with Animals subscale comprises 4 items, for example:

“This child is interested in observing animals.” Knowledge in Animal Care subscale comprises 6 items, for example: “This child identifies health conditions of animals.” Finally, Motivation in Learning comprises 2 items, for example: “This child enjoys coming to this center/school more.” The content validity of the 12 items measuring their participation was supported by literature review on environmental education for young children, analysis of NaturKind program manual, and several panel meetings among the institute staff members, NaturKind program trainers, and the project evaluators. The rating was conducted using a 4-point likert type scale (i.e., 1: never - 4: always). Cronbach alpha reliability coefficient for the children’s participation scale was .95.

Children’s developmental change. The children’s developmental change was measured by social and emotional development. The items were adopted from pre-existing scales measuring young children’s social and emotional development (Vineland Adaptive Behavior Scales, Sparrow, Balla, & Cicchetti, 1984; Vineland Social-emotional Early Childhood Scales, Sparrow, Balla, & Cicchetti, 1998). Using the scales, the teachers then rated their children’s participation and developmental change across three measurement points. The rating was conducted using a 4-point likert type scale (i.e., 1: never - 4: always). The Cronbach’s alpha reliability coefficients of social and emotional development scales were .92 and .88 respectively.

Procedure

Since the NaturKind program does not require any program sequences, its implementation was very flexible. The program could be modified and adjusted in accordance with the curriculum of each preschool or kindergarten. As a semi-structured program, NaturKind did not provide a series of specific topics for young children’s activities. However, through the teacher workshops, RTPI provided detailed guidelines for classroom activities including topic selection, utilization of mini-habitats, role playing, and so forth. For instance, in a free play time, young chil-

dren were encouraged to choose appropriate themes or topics (e.g., who is stronger?) for their activities. Then, young children chose their mini-habitats and enjoyed the play time with peers. In this study, snails were frequently utilized for their activities. By touching, smelling, and manipulating snails, young children had opportunities to learn about snails.

All research procedures including data collection methods were reviewed and approved by institutional review board. After having the permission, the assessment packet was sent to the RTPI. The RTPI made enough copies of the packet and sent them to two preschools. Before collecting data from the two preschools, data collection procedures were explained to the teachers and parents who agreed to join the study. The teachers rated their children's participation in the program and their developmental change across three measurement points. The measurement interval was about 3 months.

Results

Teachers' ratings of children's participation and their developmental change were analyzed by each construct. Children's participation was measured by comfort in interaction with animals, knowledge in animal care, and motivation in learning. Means and levels of significance for each construct by three measurement points were summarized in Table 1.

Table 1. *Means and Standard Deviations of the Children's Participation by Construct*

Constructs	# of items	Mean			<i>F</i> value
		<i>M1</i>	<i>M2</i>	<i>M3</i>	
Comfort in interaction with Animals	4	10.73	12.43	14.73	16.70**
Knowledge in animal care	6	15.73	19.40	20.60	15.30**
Motivation in learning	2	6.13	7.00	7.80	14.24**

Note: m1-m3: Mean of each measurement point, ** $p < .01$

Three means show that children's participation (i.e. comfort, knowledge, and motivation) scores increased across time. In order to examine the mean difference across three measurement points, a repeated measures ANOVA was conducted. The results showed that all mean differences in those three areas were statistically significant ($F = 16.70, p < .01$; $F = 15.297, p < .01$; $F = 14.243, p < .01$). In other words, the children's comfort in interaction with animals, knowledge in animal care, and motivational in learning were significantly increased after participating in the program.

Table 2. *Mean and Standard Deviation of the Children's Participation by Item across Three Measurement Points*

Constructs	Item	Mean (SD)		
		M1 (SD.)	M2 (SD)	M3 (SD)
Comfort in interaction with animal	1 is interested in observing animals	2.93 (.80)	3.00 (.76)	3.80 (.41)
	2 feels comfortable with handling animals	2.13 (1.06)	2.86 (1.29)	3.53 (.83)
	3 is comfortable involved in animal related activities	2.73 (.80)	3.20 (.86)	3.73 (.46)
	4 tells friends about the animal	2.93 (1.03)	3.13 (1.06)	3.67 (.62)
Knowledge in animal care	1 Identifies health conditions of animals	2.27 (1.16)	3.07 (1.10)	3.47 (.83)
	2 Recognizes how animals' lives are linked to his/her life	2.27 (.80)	3.13 (.74)	3.13 (.99)
	3 tries to learn more knowledge about animals	2.87 (.92)	3.33 (.62)	3.47 (.83)
	4 knows regulations for a safe animal care	2.93 (1.03)	3.40 (.83)	3.60 (.74)
	5 knows how to feed animals	2.87 (1.25)	3.40 (.91)	3.60 (.74)
	6 Know how to control water, light, and other conditions for animals	2.53 (1.41)	3.07 (1.16)	3.33 (.82)

Constructs	Item	Mean (<i>SD</i>)		
		<i>M1</i> (<i>SD</i>)	<i>M2</i> (<i>SD</i>)	<i>M3</i> (<i>SD</i>)
Motivation in learning	1 enjoys coming to this center/school more	3.00 (1.07)	3.33 (.62)	3.87 (.35)
	2 feels more animated in learning	3.13 (.74)	3.67 (.49)	3.93 (.26)

Note: *M1-M3*: Mean of each measurement point

SD1-SD3: Standard deviation of each measurement point

More detailed information of their participation by item is summarized in Table 2. Among 12 items, two items showed remarkable score differences across time: “Feels comfortable with handling animals” and “identifies health conditions of animals.” Relatively, children’s scores on these two items at the first measurement were rated very low compared to other 10 items. However, at the second and third measurement, their scores changed dramatically. These two item scores thus show the program’s positive impact in terms of children’s active participation in the program.

The teachers’ rating of their children’s social/emotional development is presented in Table 3. Three mean scores show that children’s social/emotional development has changed since they started participating in the NaturKind program.

Table 3. *Means and Standard Deviations of the Teachers’ Rating of Children’s Developmental Change by Construct*

Constructs	# of items	Mean			<i>F</i> Value
		<i>M1</i>	<i>M2</i>	<i>M3</i>	
Social development	9	27.64	31.93	34.87	27.47**
Emotional development	8	23.43	28.43	31.07	50.26**

** $p < .01$

Note: *M1-M3*: Mean of each measurement point

In order to examine the mean difference across three measurement points, a repeated measures ANOVA was conducted. The results showed that all mean differ-

ences of the social and emotional development scores were statistically significant ($F = 27.47$, $p < .01$, $F = 50.26$, $p < .01$). In other words, the children's social/emotional development scores were increased after participating in the program.

More detailed information of their participation by item is summarized in Table 4. There were two items that showed remarkable score differences across time: "Asks friends for help with my problems" and "tries to understand how my friends feel when they are angry, upset, or sad." That is, children's scores on these two items were rated lower than the other items at the first measurement. However, their scores changed at the second and third measurement.

Table 4. *Mean and Standard Deviation of the Children's Developmental Change by Item across Three Measurement Points*

Constructs	Item	Mean (<i>SD</i>)		
		<i>M1</i> (<i>SD</i>)	<i>M2</i> (<i>SD</i>)	<i>M3</i> (<i>SD</i>)
Social Development	1 Responds verbally to teachers' social talk	3.73 (.46)	3.80 (.41)	3.93 (.26)
	2 Initiates discussion on topics of particular interest to others	3.00 (.55)	3.60 (.63)	4.00 (.00)
	3 listens to adults when they are talking with me	3.47 (.64)	3.73 (.46)	3.93 (.26)
	4 listens to my friends when they talk about problems they are having	2.60 (.74)	3.53 (.52)	3.87 (.35)
	5 Initiates active plays with friends	3.07 (.88)	3.53 (.74)	3.93 (.26)
	6 asks friends for help with my problems	2.27 (.88)	3.13 (1.06)	3.80 (.41)
	7 Shares toys while playing with other children without being asked	3.20 (.68)	3.47 (.52)	3.73 (.46)
	8 Waits for his/her turn while playing games when reminded	3.33 (.72)	3.67 (.49)	3.80 (.41)
	9 Invites other children to play	3.07 (.83)	3.87 (.74)	3.87 (.35)

Constructs	Item	Mean (<i>SD</i>)		
		<i>M1</i> (<i>SD</i>)	<i>M2</i> (<i>SD</i>)	<i>M3</i> (<i>SD</i>)
Emotional Development	1 Shows two or more recognizable emotions such as happiness, fear, anxiety, and so forth	3.53 (.74)	4.00 (.00)	3.93 (.26)
	2 Shows his/her expectations about class activities	2.93 (.59)	3.47 (.64)	3.93 (.26)
	3 Understands other people's emotion	2.57 (.51)	3.33 (.62)	3.93 (.26)
	4 Laughs or smiles appropriately in response to encouragement	3.73 (.59)	3.93 (.26)	4.00 (.00)
	5 tells others when he/she is upset with them	2.47 (.92)	3.67 (.62)	3.93 (.26)
	6 Tries to understand how my friends feel when they are angry, upset, or sad	2.27 (.70)	3.07 (.80)	3.73 (.46)
	7 Comforts other children who are upset	2.53 (.83)	3.13 (.74)	3.67 (.62)
	8 Feels good about self	3.13 (.64)	3.64 (.50)	3.93 (.26)

Note: *M1-M3*: Mean of each measurement point

SD1-SD3: Standard deviation of each measurement point

Discussion

The purpose of this study was to examine the impact of Nature Kind, a nature-based program, on young children's development. For this purpose, 15 young children were selected and assigned to the program. In order to explore the program effectiveness, a simple experimental design (i.e., within group without comparison group) was employed. As dependent variables, young children's participation quality, social development, and emotional development scores were analyzed.

According to the results of data analyses, the impact of the program was turned out overall positive among the participants. Based upon teachers' rating of children's participation in the program and their developmental change, in particular, there were statistically significant differences in all five areas: comfort in interaction with animals, knowledge in animal care, motivation in learning, social development, and

emotional development. Therefore, the results support theoretical arguments (Louv, 2005; Kim & Lim, 2007; McHenry & Buerk, 2008; Wilson, 1996) emphasized the importance of young children's interaction with nature.

Another positive impact of the program was observed from young children's increased involvement in the program showing their developmental growth through interaction with animals. At first, the participating children did not have comfortable feeling with animals. Actually, some children even screamed when they saw snails for the first time. The children who showed relatively positive attitudes toward interacting animals were also reluctant to touch snails. As time went on, those children became active observers and eventually came to touch snails.

Along with the comfortable feeling, children's increased knowledge of animals and their care is also noteworthy. Once those young children felt comfortable with animals, they were observed to try to know about animals' characteristics. In fact, during the research, it was observed that, a young child who had mild autism experienced an awakening feeling in his life. After interacting with a small snail, he started searching information about snails. After studying about snail's habits, life style, and other biological characteristics, he eventually became a doctor of snail in his class. Thus, all friends asked questions about snails to him. Through the question-answer activities, the child became a very active talker and communicator with his friends and teachers as well.

The participating children who experienced fun and meaningful interaction with animals, their motivation in learning also changes. For instance, using snail as a project theme, young children expand their knowledge structure to upper level of learning (e.g., who can eat snails?, can snails fight against snakes?). It shows a kind of knowledge transfer in that active interaction with animals provides opportunities for young children to know more about different animals, food chain, and eco system.

In the NaturKind program, young children have enough opportunities to observe, touch, and smell many different types of animals. Through these activities, young

children experience joy, wonder, curiosity, and so forth. The results of this study support the findings of previous studies which emphasize emergent experiences at natural setting (Nimmo & Hallett, 2008; Wilson, 1996). Therefore, it can be said that NaturKind is also providing meaningful experiences for young children to facilitate their knowledge construction as well as enhancement of motivation in learning.

Interestingly, among 12 items measuring young children's participation in the program, two items showed remarkable score differences across time: "Feels comfortable with handling animals" and "identifies health conditions of animals." Relatively, children's scores on these two items at the first measurement were rated very low compared to the other 10 items. However, at the second and third measurement, their scores changed dramatically. These two item scores show positive program impact in terms of children's active participation in the program.

In the NaturKind program, it was also posited that the children's social/emotional development could be enhanced through dynamic interaction with peers and teachers. For instance, their active conversation through snail activities in which the children discussed and learned characteristics of snails, as well as their relationship with other animals resulted in an increase in the children's social and emotional development across time. In particular, their scores on two items (i.e., "asks friends for help with my problems" and "tries to understand how my friends feel when they are angry, upset, or sad") changed drastically across three measurement points. The score change reveals that the children's developmental change through peer interaction was active. It is critical to note that the extent of child development in these areas is dependent upon effective implementation of the program. The results also support previous studies (Louv, 2005; Wilson, 1993, 1995) addressed the impacts of nature-based program on young children's social and emotional development.

The results of this study suggest a couple of implications for further research on nature-based education for young children. First, it may be necessary to investigate what aspects of young children's interaction with animals contribute more in chang-

ing their development. For example, young children's interaction may differ according to various activities such as touching, smelling, manipulating, and so forth. Second, not only individual level interaction with animals, but also diverse activities at group level interaction may be analyzed. Third, in order to understand young children's interaction with animals and communication with peers, it is necessary to conduct qualitative research through observations and in-depth interviews.

However, it should be cautious to interpret the results of this study. The primary limitation of the current study is that the analysis was conducted using a small number of participants from two preschools. Therefore, it will be necessary for researchers to conduct more studies with a sufficient number of participants from diverse areas. In terms of developmental areas showing the impacts of NaturKind program, this study just focused on social and emotional development only. In spite of these limitations, however, this study is believed noteworthy in that it is one of few studies providing empirical evidence for the positive influence of a nature-based learning program on children's development.

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