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Status and Education Programs of Public Children's Gardens in the United States

by

Min Hyeong Kwon

Department of Biosystems and

Biotechnology

Graduate School

Korea University

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Under the Guidance of

Professor Dr. Woo-Kyun Lee

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by

Min Hyeong Kwon

Approved as to style and content by:

Chairman Chun Ho Pak

Committee Woo-Kyun Lee

Committee Ho Joung Lee

Committee Kwang Woo Park

Committee Hee Chae Kim

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Status and Education Programs of Public Children's Gardens in the United States

Name: Min Hyeong Kwon

Department: Biosystems and Biotechnology

Advisor: Professor Dr. Woo-Kyun Lee

Abstract

The purpose of this study was to examine the status and education programs of public children's gardens in the United States and evaluate their role as a place to provide nature experiences and learning for children.

1. Status of public children's gardens

This study identified 776 public gardens and examined 163 of them using a comprehensive online survey. The sampled public gardens were widely distributed throughout the United States, although they were located primarily in the eastern and western regions of the United States. We found that 55% of the 163 public gardens had a children's garden, and 26.4% planned to add a children's garden in the near future. Public children's gardens were typically in a botanical garden and were generally added less than 20 years after the public

gardens were created. Most of the public children's gardens had a stated main purpose of providing children with environmental education by allowing them to experience the natural environment through play. Most children's gardens occupied a small proportion (less than 1 acre) of the overall size of a public garden. Among demographic and socioeconomic factors, such as population density, income, and education level (e.g., college graduate), per capita income was associated with counties having more public children's gardens.

2. Education programs in public children's gardens

The overall content and implementation of children's education programs as a subset of general public education programs offered by public children's gardens in the United States were examined. Children were a major target audience of the examined public gardens, followed by adults, families, and youth. Overall, public children's gardens tended to offer more programs (8.0% – 20%) compared with public gardens without children's gardens. Additionally, there was a greater diversity of children's education programs offered (classified into 10 topics and 11 activities) in public children's gardens. The most frequently offered topics were plants (39.1%), animals (22.0%), and art (11.3%). Observation was the most frequently offered activity (17.1%), followed by visual art (14.4%). However, the proportions of offered programs significantly

differed across individual public children's gardens. The subjects (i.e., topics and activities) offered by children's education programs were more often directed toward younger children with biology topics. However, for the programs targeted toward older children, non-biology and complex topics were offered more often. Education coordinators and horticulture directors were asked about desired improvements to children's education programs. A large number of respondents (50) indicated a need to develop programs with greater topical variety, revealing a desire to diversify programs. Thus, it is important to diversify the natural environmental experiences of education programs for children through developing children's gardens and age-specific education at public children's gardens in the United States. Such an improvement will not only increase the number of public garden visitors but also satisfy the expectations of parents and educators by providing more nature-based, environmental experience to children for better mental and character development.

Keywords Nature environment, botanic garden, public garden curriculum, school garden, demographic and socioeconomic

요약문

본 연구는 미국 공공정원 내 어린이정원의 현황 및 조성에 영향을 미치는 요소를 알아보고, 어린이정원이 조성된 공공정원에서 제공하는 어린이 교육프로그램의 실태 및 개선사항을 조사, 분석하여 공공정원 내 어린이정원의 조성이 자연환경 체험교육장으로서의 역할 정립과 발전 방향을 알아보기 위하여 본 연구를 수행하였다.

1. 공공 어린이정원의 현황

미국 공공정원 내 어린이정원의 현황을 파악하기 위하여 미국 내 공공정원을 조사하고, 작성된 776 곳의 공공정원을 대상으로 온라인 설문을 실시하여 회수된 163 곳의 샘플 공공정원을 통하여 연구를 수행하였다. 조사된 공공정원의 지리적 분포 현황으로는 대부분 미국 전역에 널리 분포되어 있었으나 주로 동부와 서부 지역 등에 밀집되어 있는 결과를 보였다. 조사된 공공정원 중 어린이정원이 현재 조성된 곳은 55%, 현재 어린이정원이 공사중 이거나 계획되어 가까운

미래에 조성될 어린이정원은 총 26.4%로 앞으로 증가될 것으로 예상된다. 어린이정원의 유형으로는 주로 식물원에 조성된 것이 일반적이었고, 어린이정원은 주로 공공정원이 조성된 이후인 20 년 전후로 계획되어 조성되는 것으로 조사 되었다. 어린이정원의 조성목적은 자연환경을 접하며 놀이를 통한 환경교육의 학습 장소로 제공하는 것이라는 응답이 가장 많았다. 그리고 공공정원에 비례한 어린이정원의 면적은 1 acre 미만이었다. 또한 공공정원 조성에 영향을 미치는 인구통계학 및 사회경제적 측면의 요인으로는 카운티 지역의 인구수, 미취학 및 취학 아동 수, 교육수준 및 개인소득 등 이었고, 어린이정원의 경우는 개인소득의 요소가 어린이정원의 조성에 영향을 미치는 것으로 분석 되었다.

2. 공공 어린이정원의 교육프로그램

현재 미국 공공정원에서 제공하는 프로그램 중 어린이를 대상으로 운영하는 교육프로그램의 현황과 분야별 프로그램을 알아본 바 미국 공공정원 내 어린이정원의 유무에 따른 대상별 교육프로그램은 어린이, 어른, 가족, 그리고 청소년 순으로 나타났다. 그러나 이는 공공정원 내 조성된 어린이정원의 유무에

따라 차이가 나타나 어린이정원이 조성된 공공정원에서 제공하는 교육프로그램은 어린이정원이 조성되지 않은 공공정원에서 보다 최소 8.0% 이상 20% 미만 정도 높은 비율로 제공되는 것으로 조사 되었다. 또한 프로그램 분야(10 개 주제와 11 개 활동 분야)에 대해서도 어린이정원이 조성된 공공정원에서 제공하는 교육프로그램은 그렇지 않은 공공정원에서 훨씬 더 다양한 프로그램을 제공하고 있었다. 이에 따라 공공 어린이정원(어린이정원이 조성된 공공정원)에서 제공하는 어린이 교육프로그램 분야를 분석한 결과 주제 분야는 식물 39.1%, 동물 22.0% 그리고 예술 11.3% 순이었고, 활동 분야로는 관찰이 17.1% 로 가장 높았고, 다음으로 미술활동이 14.4% 높은 것으로 분석 되었다. 그러나 이는 각각의 공공 어린이정원에 따라 제공되는 분야별 프로그램의 비율에 대해서는 큰 차이가 있는 경향을 나타냈다. 한편 어린이 교육프로그램의 주제와 활동분야는 연령에 따라서 주로 미취학의 유치원과 초등학교 저학년에 집중 되어 있었고, 저학년일수록 생물적 자연과학 분야의 프로그램이 구성되었고, 고학년으로 올라 갈수록 비생물적 및 복합적 주제의 분야별

프로그램이 주를 이루었다. 어린이 교육프로그램의 개선사항에 대하여 공공 어린이정원의 교육관련 담당자로부터 응답 받은 결과로는 더욱 다양한 주제의 어린이 교육프로그램을 제공하는 개발이 필요하다는 항목이(50) 가장 높게 나타나 이는 공공 어린이정원에서 제공하는 분야별 프로그램은 다양하나 각각 공공 어린이정원에서 제공되는 교육 프로그램의 비율이 불균형함에 따른 현상으로 프로그램의 다양화를 추구하는 것으로 생각된다.

이러한 본 연구의 결과로 어린이정원 조성을 통하여 공공정원에서 어린이 교육프로그램의 다양화 및 연령별 특성에 맞는 교육프로그램의 개발이 중요한 것으로 판단된다. 또한 공공 어린이정원 조성의 필요성은 공공정원의 측면으로는 방문객 증대를 촉진시키고 학부모 및 교육자 측면에서는 어린이들에게 전인적 인격 형성을 위한 자연환경 체험교육의 장으로 자리매김 할 수 있다고 본다.

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Chapter 1. Introduction

Most people living in cities are experiencing cultural changes due to the lack of natural space resulting from a concentrated population and urban development caused by rapid industrialization and urbanization movements after the Industrial Revolution of the late 18th century (Tai, 2006).

Children living in cities far from nature spend most of their time indoors instead of engaging in outdoor activities, and the physical and psychological illnesses resulting from spending too much time indoors have become a serious social issue (Louv, 2008).

Various study results confirm that learning in nature through experience increases children's curiosity and enjoyment and helps them to develop various abilities, including creativity, imagination, and intellectual capacity (Moore and Wong, 1997).

Hence, this research aimed to understand the current state, role and direction of the improvement of children's gardens designed from a child's viewpoint and to allow them to experience a natural environment within a city. Additionally, by analyzing the education programs provided in children's gardens, this research aimed to reveal the current state and importance of children's gardens as education facilities that provide

experiences in nature and to determine directions for improvements.

1.1 Status of public children's gardens

Most people around the world today live in urban areas and spend most of their time in urban spaces. The urban population in the United States was approximately 10.8% before the Industrial Revolution began in 1840, but it increased to 80.7% by 2010 (United States Census Bureau, 1990, 2010). The United Nations reports that 54% of the world's population now lives in urban areas, and this number is expected to increase (United Nations, 2014).

Rapid industrialization and urbanization have produced a phenomenon in which contemporary citizens are living increasingly farther from nature (Nabhan and Trimble, 1994). This phenomenon is referred to as "nature deficit", and the related disorder has resulted not only in mental problems such as depression or stress and physical health problems such as cardio-cerebrovascular disease, heart disease, diabetes, colorectal cancer, and osteoporosis but also in environmental pollution and climatic change in urban areas (Halverson et al., 2008; Lee and Maheswaran, 2011; Louv, 2008; McMichael, 2001).

As the issue of nature deficiency in urban areas has become more prominent, people have become interested in green spaces and access to

natural environments. Urban public gardens provide environmental benefits to the natural ecosystem that bridge the natural environment with urban areas to reduce stress and produce a restorative effect on people (Cooper-Marcus and Barnes, 1995; Kaplan and Kaplan, 1989; Lewis, 1996; Rakow, 2011; Ulrich, 1999). Moreover, urban public gardens resolve social problems in urban society by offering a variety of educational opportunities and social gathering spots (Goddard et al., 2010; Lewis, 1992; Robertson, 1996; Sherer, 2006; Waliczek et al., 2000).

Public gardens are considered leisure destinations like museums, parks, or zoos. According to a 2011 report about the leisure market in the United States, gardening was included among the top 10 leisure activities (Falk, 1998; Leisure Market Research Handbook, 2012), and the increase of gardening as a leisure activity has been associated with the increased numbers of visitors to public gardens (Connell, 2004, 2005). According to research on children's preferences for leisure activities, however, children tend to prefer indoor activities, such as watching TV, reading, using a computer, playing video games or using other modern media (Cherney and London, 2006; Moore and Wong, 1997). The phenomenon in which children have more time to adapt to indoor lifestyles that are distant from natural environments has exacerbated health problems such as childhood

obesity, asthma, attention deficit/hyperactivity disorder (ADHD), and atopic dermatitis resulting from vitamin D deficiency (Mithal et al., 2009; Moore and Wong, 1997; Perrin et al., 2007; Taylor et al., 2001; Taylor and Kuo, 2009).

Because greater numbers of problems are arising for children who have less time to experience natural environments, environmental education researchers in the United States have been studying children's gardens as places where children can improve their physical and mental health and sociability through the pleasure and play they experience in a natural environment encountered within a city (Halverson et al., 2008; Miller, 2005; Tai, 2006; Taylor, 1994).

A public children's garden is a garden targeting children and that is designed to meet children's needs. This type of garden is a public space open to people of all ages, and the different types include school gardens, children's hospitals, community gardens with children's gardens, and public gardens with children's gardens (hereafter referred to as public children's gardens) (Miller, 2005; Sobaski, 2006; Whitehouse et al., 2001).

Public children's gardens are equipped with opportunities for activities such as rest, leisure, and education and have been firmly positioned as alternative spaces that can help children become aware of

natural environments. These spaces intrigue children at the appropriate level and aid in relieving various juvenile social problems resulting from nature-deficit disorder. Children's gardens are places that all family members can engage and enjoy regardless of age [American Horticultural Society (AHS), 2005; Maller and Townsend, 2006; Taylor, 1994]. Additional research on family leisure activities has reported that family-oriented leisure activities enhance family bonds and healthy relationships. The selection of leisure activities by young children is influenced by their parents (Hawks, 1991; Holder, et al., 2009; Shaw and Dawn, 2001). Therefore, public children's gardens not only allow for the rest, leisure, and education of children but also benefit the families who visit them.

The early nineteenth-century German educator, Friedrich Froebel, coined the term kindergarten, or "garden for children," as early as 1837. At this time, many western Europeans believed that urban children were impacted by a lack of exposure to nature. In response, European educators began to create garden play areas for children in schools and public spaces. This idea spread quickly throughout Europe's schools (Shair, 1999). In the United States, the Massachusetts Horticultural Society sponsored the first American school garden at Boston's Putnam School in 1891. The Nature Study Movement had begun blossoming in 1909, which

helped highlight the importance of nature in education (Eberbach, 1988; Shair, 1999).

The first children's garden established in a public garden in the United States was the Brooklyn Botanic Garden, which was built in New York in 1914 to help educate children about gardening (Sobaski, 2006). With this garden as an exemplary case, children's gardens began to gradually spread throughout the United States (Stone, 1984; Trelstad, 1997). In 1993, the Michigan 4-H Children's Garden was established at Michigan State University in East Lansing to teach children about the importance of plants, to induce curiosity, and to provide experiences of aesthetic richness while including many educational elements. Everett Children's Adventure Garden, which opened 1998, was a 12-acre garden in the New York Botanical Garden and was a discovery center that provided educational exhibits, projects and a children's laboratory. Its development added an educational function to a public garden (Shair, 1999; Sobaski, 2006).

In Asia, the first public children's garden, Yokohama Municipal Children's Botanical Garden, located in the Kanagawa Prefecture in Japan, was first opened to the public in 1979. This garden was designed to educate children about the environment. Opened in 2007, the Jacob Ballas

Children’s Garden at the Singapore Botanic Garden was designed based on the belief that “All Life on Earth Depends on Plants.” In January 2011, Chenshan Botanical Gardens, a 2.47-acre children’s garden in China, was designed to intrigue children. In May 2011, a children’s garden at the Korea National Arboretum in South Korea was designed to incorporate children’s opinions (Kwon, 2012). The recent development of children's gardens in public gardens throughout Asia appears to be influenced by gardens in Western countries.

As the importance and popularity of children's gardens has increased, many studies have emerged about the design elements of children's gardens in the United States (DiMare, 2012; Eberbach, 1988; Miller, 2005; Miller, 2010; Sobaski, 2006) as well as the importance of spaces for environmental education (Halverson et al., 2008; Hoffman, 2008; Tai, 2006) and spaces for the mental and physical development of children (Maller and Townsend, 2006; Pretty et al., 2005). However, little research has been conducted using quantitative data or analyses that show the overall distribution and status of public children’s gardens in the United States.

Accordingly, this study was designed to examine the distribution of public children’s gardens, to understand their presence, and to determine

the demographic and socioeconomic factors that affect the development of children's gardens, with the overall goal of illustrating the status and future development of children's garden**.**

1.2. Education programs in public children's gardens

Childhood is a pivotal period during which the brain actively and rapidly develops. According to developmental psychologists and educators such as Piaget and Inhelder (1969), Piaget (1973), Vygotsky (1978), and Malaguzzi (1998), children are highly sensitive to outdoor environments. The experience of obtaining new information from such environments affects their thoughts.

Children are heavily influenced by their environments and are easily captivated by their immediate physical environment, which stimulates the five senses (Krantz, 1994). Friedrich Froebel emphasized the importance of this immediate environmental experience, claiming that such contact with nature influences children's mental and moral development (Beatty, 1995; Herrington, 2001).

Several studies have noted the importance of forming an environmentally friendly perspective through contact with nature during childhood. This perspective becomes a key element in determining one's awareness of and attitude toward nature in adulthood (Groening, 1995; Kahn, 2002; Wake 2007; White and Stoecklin, 1998). Many studies have argued that such contact increases an individual's abilities regarding communication of knowledge, relaying of emotion, originality, sociability,

confidence, creativity, imagination, power of observation, and personal relationships. Preschoolers exposed to nature are able to obtain a wider range of information and have better experiences when they enter school (Miller, 2007; Park and Huh, 2010). Additionally, elementary school children show more positive awareness of the natural environment and an increased interest in and satisfaction with academic subjects such as science and math when they are presented in experience-based environmental learning in gardens compared with learning in conventional school settings (Catsambis, 1995; Farenga and Joyce, 1998; Simpson and Oliver, 1990; Yager and McCormack, 1989; Yager and Yager, 1985).

Europe recognized the importance of environmental experience-based learning relatively early. European educators began to create school gardens in the mid-1800s. These gardens later spurred the United States to follow this movement in the 1900s (Bachert, 1976). Additionally, the nature-study movement, which began in the early twentieth century, emphasized the importance of education through children's contact with nature and motivated the creation of children's gardens in schools (Shair, 1999). Thus, the children's garden concept evolved from the nature-study movement. In 1911, Ellen Eddy Shaw created one of the first children's

gardens at the Brooklyn Botanical Garden. Concurrently, awareness of the importance of environmental education increased, and public institutions began providing more spaces for children to experience the natural environment (Eberbach, 1988; Halverson et al., 2008).

Against this backdrop, natural and environmental experience-based learning programs that were offered by public gardens for exhibition, conservation, and education were believed to be the perfect laboratories for children to nurture a sense of scientific curiosity and understand the value of life. Furthermore, it was believed that such lessons could not be attained from a textbook-oriented school system (Mohrmann, 1999; Steil and Lyons, 2009). A comparative study of an activity-based curriculum provided by public gardens and a traditional textbook-based curriculum in school showed that students experienced superior learning outcomes with an activity-based curriculum (Bredderman, 1982). With activity-based education, students learn in a self-directed manner by focusing on their own interests. Thus, compared to education in which such activities are optional, activity-based education increases the influence of learning on students (Wilson, 1996).

Therefore, the concept of a children's garden, which is designed as a place for children to experience the natural environment, has evolved over

the last 15 years. A children's garden is considered an optimal place to motivate one's curiosity, research, and learning through contact with nature in playful and enjoyable ways (DiMare, 2012; Halverson, 2005; Sobaski, 2006). Consistent with these findings, the number of children's gardens within public gardens (hereafter referred to as "public children's gardens") has been steadily increasing in the United States (Finch, 1995; Kwon et al., 2015).

The interest in and importance of children's nature experience-based learning have increased. Studies have been conducted to examine the influence that environmental education programs provided by school gardens have on children's environmental awareness and attitudes (Miller, 2007; Skelly and Zajicek, 1998; Smith, 2003; Waliczek et al., 2001). Additional studies have sought to identify the benefits of the mental and social influences that nature experience programs have on children (Alexander et al., 1995; Konoshima, 1995; Maller, 2009; Maller and Townsend, 2006) and to evaluate adolescent education programs in public horticultural institutions (Purcell et al., 2010). However, few published studies quantitatively examine children's education programs that public children's gardens in the United States provide.

Therefore, this study examines the status of children's education

programs offered by U.S. public children's gardens (as an experiential natural environment learning space) and analyzes their implementation and their subjects (i.e., topics and activities) to provide recommendations for their improvement. Furthermore, this study also recommends establishing public children's gardens and developing their education programs in countries that are starting to focus on children's education in public children's gardens.

Chapter 2. Status of Public Children's Gardens

2.1. Methodology

2.1.1. Study design

This study was conducted from Jan. 2010 to Aug. 2014. To determine the distribution and status of children's gardens situated within public gardens in the United States, a list of public gardens in the 50 states and Washington, DC, was compiled using 12 sources, including six official garden-related institutes, two private informational websites, two Internet search engines, and two children's garden-related literature resources. The six official garden-related institutes included the AHS (2010), the American Public Gardens Association (APGA, 2010), Botanic Gardens Conservation International (BGCI, 2010), the Children's Garden Network (CGN, 2011), The Morton Register of Arboreta (MRA, 2011), and the National Gardening Association (NGA, 2010). The two private informational websites included The Garden and Landscape Guide, Nightingale Garden Company Limited (1998) and Groundspeak Inc. (2010). The two Internet search engines utilized were Google, Inc. (1998b) and Wikipedia (2001). The two children's garden-related literature resources included the book *Designing Outdoor Environments for Children* (Tai, 2006) and the thesis entitled *An Investigation of*

Interactivity at the Michigan 4-H Children's Garden (Sobaski, 2006).

A list was compiled from the 12 sources and included a total of 776 places that met Rakow's (2011) definition of a public garden (Table 1 and Fig. 1), which states that "a public garden is a mission-based institution that maintains collections of plants for the purposes of education, research, conservation, and/or public display. It must have a system for maintaining plant records and professional staff, be open to the public and provide accommodations for access to all people." The public gardens contained in the list were categorized into six different types, as defined by Rakow (2011): arboreta, botanic gardens, conservatories, display gardens, historic landscapes, and zoos.

To investigate the presence of children's gardens within the 776 listed public gardens (Appendix 1), an online survey was conducted using Survey Monkey (2011) between July 2011 and Jan. 2012 by sending questionnaires to the education coordinators and horticulture directors at each of the 776 public gardens. Additionally, the type of public garden represented by each garden was researched on each garden's website (Table 2). The survey included questions regarding the presence of children's gardens (Table 1 and Fig. 2), their purpose (Table 3), their year of establishment (Fig. 3), and their size (Fig. 4) (Appendix 2). The size of

each public garden and the year of its establishment were verified using each garden's website (Fig. 3 and 4). The number of news articles published about children's gardens during 1990–2014 was determined by searching the term "children's gardens" in Google, Inc. (1998a) (Fig. 5). One hundred and sixty responses were collected from public gardens in 43 states. During July and Aug. 2014, a phone survey was performed to reconfirm the information received from the 163 public gardens that had responded to the online survey and to learn whether they were planning to build a children's garden or were currently constructing one. The data were also examined through discussions, interviews and reviews with 17 colleagues across the academic (professor), public (garden director and director of institution) and private (landscape designer, and environmental educator) sectors of public gardening (Appendix 3).

2.1.2. Data analysis

Pearson's correlation test was conducted using the overall number of public gardens and the public gardens surveyed in each state to determine the relationship between those surveyed and the total number of public gardens. Using news articles published between 1990 and 2014 retrieved from Google, Inc. (1998a), a frequency analysis was performed to investigate the presence of public children's gardens (Table 1), the

differences among the six different types of public gardens (Table 2), the number of established public gardens and children's gardens (Fig. 3), the sizes of public gardens and children's gardens according to their ground area (Fig. 4), and the relationship between social interest in children's gardens and their establishment (Fig. 5). Additionally, a multiple-response analysis was conducted to determine the purposes of establishing public children's gardens (Table 3).

A *t*-test was performed using data from the 2000 census to determine the factors that influenced the presence of public children's gardens (Table 4) and the presence of public gardens in general (Table 5), including the local populations' demographics, number of children (under 5 years old and 5 to 17 years old), education level (number of people with university degrees or higher), and economic level (per capita income) in the surveyed counties. All the statistical analyses were conducted using SPSS 20.0 for Windows (IBM, Armonk, NY).

A spatial analysis technique based on GIS (Geographic Information System) was employed to analyze the density (Fig. 1A, B, and 2B), geographical distribution (Fig. 2A) and area ratio of children's gardens to public gardens in the United States (Fig. 4A). This study projected the location data of public gardens using Albers Equal Area Conic projections

after identifying their longitudes and latitudes using addresses. We used the spatial data to analyze the density of public gardens and to map county population density. All of the GIS analyses were conducted using ESRI ArcGIS 10.0 (ESRI, Redlands, CA).

2.2. Results and Discussions

2.2.1. Distribution of public gardens

Data on all 776 public gardens collected from the 12 sources described in the methodology were used to analyze the density of public gardens and the distribution of county population in the United States. Most public gardens are located in states on the east and west coasts of the United States, including New York (48), Pennsylvania (44), Florida (43), California (66), and Hawaii (27) (Table 1 and Fig. 1). The counties in the eastern and western states with high population densities have more public gardens at higher densities than do other counties. Counties with relatively low accessibility to public gardens were primarily located in the less-densely populated central United States (Fig. 1). A previous study demonstrated that greater population densities lowered the costs of providing services and resulted in increased public-sector spending (Ladd, 1992).

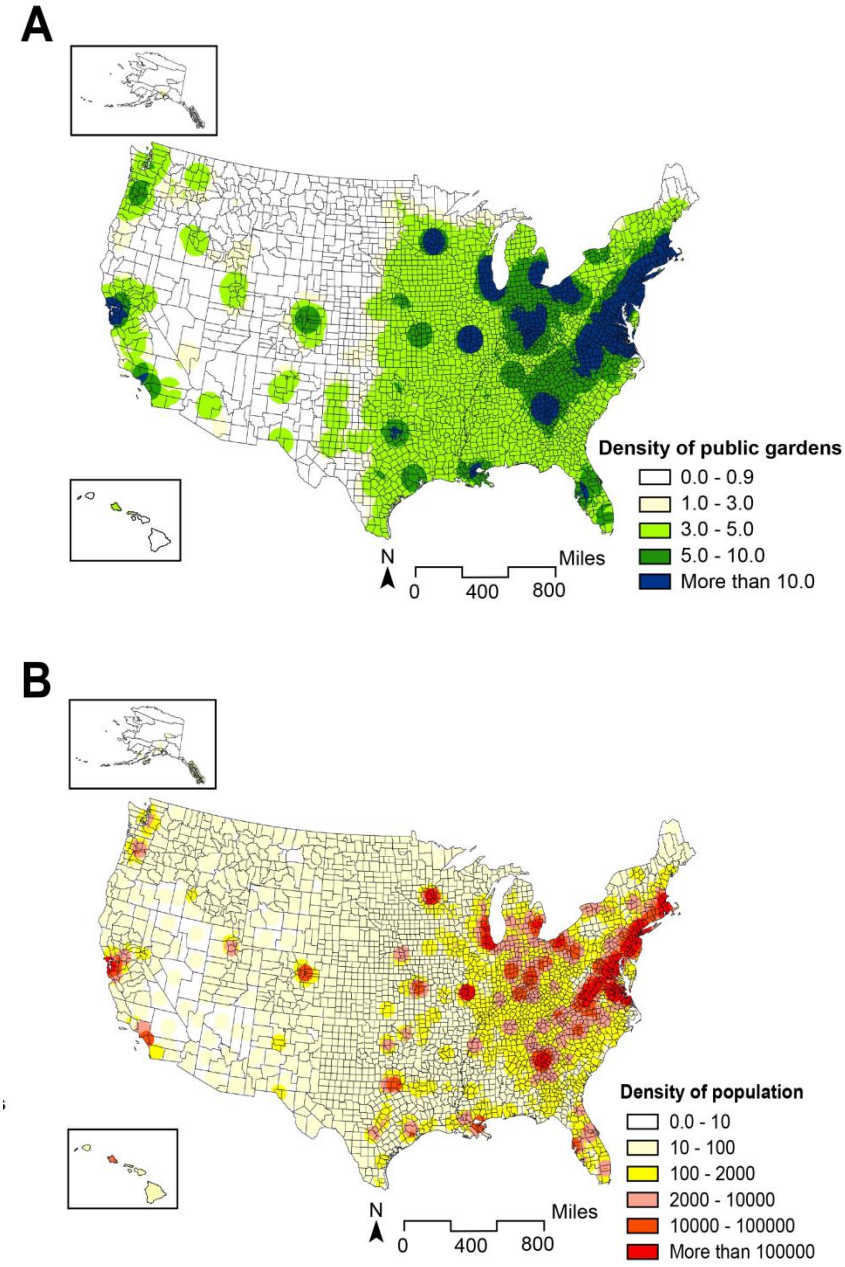

Fig. 1. Density of public gardens (A) and density of county population (B) in the United States. 1 mile = 1.6093 km.

Table 1. Distribution of children's gardens by state, as compiled from online surveys and lists of public gardens from 12 sources.

State	Sampled public garden				Public gardens	State	Sampled public garden				Public gardens
	CG[z]	CG UC[y]	CGP[x]	Without CG			CG[z]	CG UC[y]	CGP[x]	Without CG	
New York	7	1	0	1	48	Idaho	1	0	0	0	4
Virginia	7	0	2	3	20	Kansas	1	0	2	0	8
Illinois	6	0	0	0	29	Kentucky	1	0	0	1	10
California	5	1	3	2	66	Massachusetts	1	0	0	0	16
Michigan	5	0	1	0	19	New Mexico	1	0	1	0	4
North Carolina	5	1	3	0	32	Oregon	1	0	0	1	15
Pennsylvania	5	0	1	2	44	South Carolina	1	0	0	0	10
Hawaii	4	0	2	1	27	Tennessee	1	0	0	1	20
Wisconsin	4	0	0	0	17	Connecticut	0	0	0	1	6
Colorado	3	0	0	0	13	Indiana	0	0	1	0	13
Florida	3	0	2	1	43	Louisiana	0	0	1	1	11
Georgia	3	0	4	1	25	Minnesota	0	0	0	1	18

Iowa	3	0	1	0	14	Missouri	0	0	0	0	9
Ohio	3	1	1	1	25	Mississippi	0	0	0	0	6
Oklahoma	3	0	1	0	12	Montana	0	0	0	0	3
Maine	2	0	1	2	11	North Dakota	0	0	0	0	3
Maryland	2	0	0	1	10	Nebraska	0	0	0	1	9
New Jersey	2	0	0	1	27	New Hampshire	0	0	0	0	5
Texas	2	0	3	1	28	Nevada	0	0	0	1	5
Utah	2	0	0	0	7	Rhode Island	0	0	0	0	4
Alaska	1	0	1	1	4	South Dakota	0	0	1	0	5
Alabama	1	0	2	2	12	Vermont	0	0	0	0	2
Arkansas	1	0	0	0	4	Washington	0	0	2	2	24
Arizona	1	1	1	0	13	West Virginia	0	0	1	0	3
Delaware	1	0	0	0	3	Wyoming	0	0	0	0	1
District of Columbia	1	0	0	0	9	Total 163	90	5	38	30	776

[z]CG: Children's garden. [y]CGUC: Children's garden under construction. [x]CGP: Children's garden planned.

2.2.2. Status of children's gardens

The 163 surveyed public gardens were primarily located in the eastern and western regions of the country and had similar distribution and densities as the entire list of 776 public gardens (Fig. 2). A Pearson's correlation test that was conducted to verify whether the distribution of the surveyed public gardens correlated to the total distribution of public gardens in the United States showed a statistically significant correlation (r = 0.723, P < 0.01). Therefore, the conclusions drawn from our study may be considered relevant to public gardens across the United States. Among the 163 public gardens that completed the questionnaire, 90 (55.2%) had a children's garden as of 2014. Of the remaining respondents, 5 (3.1%) were currently in the process of building a children's garden, and 38 (23.3%) were planning to open a children's garden within a few years. The 30 remaining respondents (18.4%) had no children's gardens (Fig. 2). Taking into account the children's gardens under construction and those in the planning phase, approximately 80% of public gardens are expected to have children's gardens in the near future. Additionally, the states with the most children's gardens are in the eastern United States, such as New York (7) and Virginia (7), followed by those in the central region, such as Illinois (6) and Michigan (5), and those in the western part of the country, such as California (5) and Hawaii (4) (Table 1).

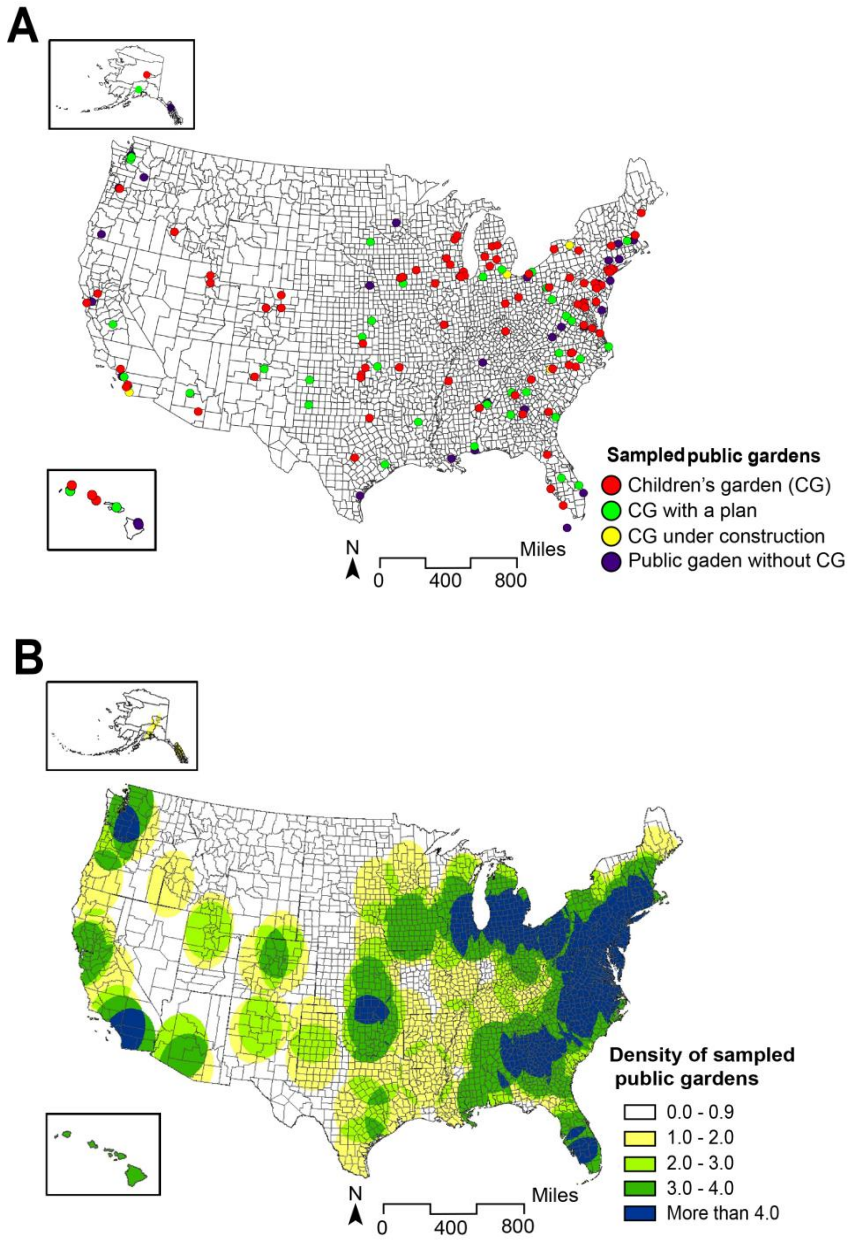

Fig. 2. Map showing the distribution of the public gardens (A) and the density of public gardens (B) in the United States. 1 mile = 1.6093 km.

Categorization of the public gardens into six types shows that the 163 public gardens that were investigated include 118 botanical gardens (72.4%), 29 arboreta (17.8%), 7 display gardens (4.3), 6 historic landscapes (3.7%), 2 conservatories (1.2%) and 1 zoo (0.6%). Most of the public gardens with a children's garden are botanical gardens (78.9%) and arboreta (12.2%) (Table 2). This result is similar to that found by Purcell (2010), who showed that botanical gardens accounted for the largest proportion (50.8%) of public gardens with adolescent involvement. Although all of the zoos and conservatories investigated through the online survey had children's gardens, these findings were mostly due to a paucity of survey respondents (2 or fewer respondents for each). However, 60.2% of the botanical gardens had children's gardens. As Vergou (2012) notes, historically, botanical gardens have not closely considered the needs of children or adolescents. However, among the factors that encourage botanical garden development, greater attention has been paid in the last 20 years to the value and importance of children and adolescents. This trend implies that among types of public gardens, botanical gardens in particular have developed an interest in establishing children's gardens. According to the definitions of botanical gardens and arboreta (Rakow, 2011), both provide the same public education function, but woody plants are the attraction in arboreta, whereas botanical

gardens harbor botanical diversity with both herbaceous and woody plants. Thus, the latter provides more diverse educational materials as a greater variety of plants are available to be seen.

Table 2. Number of public gardens and children's gardens within the six categories of public gardens.

Garden category	Public gardens (A) [no. (%)]	Children's gardens (B) [no. (%)]	Proportion of children's gardens (B/A)
Botanical gardens	118 (72.4)	71 (78.9)	60.2
Arboreta	29 (17.8)	11 (12.2)	37.9
Display gardens	7 (4.3)	3 (3.3)	42.9
Historic landscapes	6 (3.7)	3 (3.3)	50.0
Conservatories	2 (1.2)	2 (2.2)	100.0
Zoos	1 (0.6)	0 (0.0)	0.0
Total	163 (100)	90 (100)	

Among the surveyed public gardens, the ones with children's gardens report that their main purposes are to provide children with an experience of the natural environment through play as an educational place (22), to be an engaging place for families (20), and to provide education programs through experiential activities (14). Other reported purposes include providing activities for summer camps to serve children of all physical and mental abilities and encouraging children to eat more vegetables (Table 3). This result is similar to the results of previous studies, which reported that the main purpose of establishing children's gardens was to create a space for children to enhance their imagination and dreams by experiencing the natural environment while having fun (DiMare, 2012; Miller, 2005; Sobaski, 2006). The main purpose of children's gardens has not changed; they have focused on providing natural experiences to children for the past decade.

Table 3. Purposes of establishing public children's gardens (multiple responses, (n = 72).

Categories	Responses (no.)
To provide an environmental education with the experience of nature through play in a garden	22
To provide an engaging place for children and families to enjoy	20
To provide an education program with hands-on activities	14
To introduce various plants to children and demonstrate where food comes from	11
To attract children and families for garden visits	10
Others	11

An analysis of the establishment of public gardens and children's gardens considered in this study indicates that the establishment of public gardens largely remained steady until the 1940s, at which time there was a dramatic decrease. After this period, new establishments again stabilized until the 1990s, when there was an increase in the number of new public gardens. In contrast, the increase in the establishment of children's gardens only became widespread from the 1990s to 2000 and occurred alongside a surge in the establishment of public gardens during the same period.

Although fewer public gardens have been established since 2000 compared with the 1991–2000 period, our results show that the number of new children's gardens have continued to increase since 2000 (Fig. 3A). This result is in accordance with previous research (Halverson et al., 2008), which found that the timing of children's development was unsurprising as it coincided with increased attention to children's environmental education and physical and cognitive development. Additionally, most of the children's gardens located within a public garden were established less than 20 years after the corresponding public garden was established (Fig. 3B).

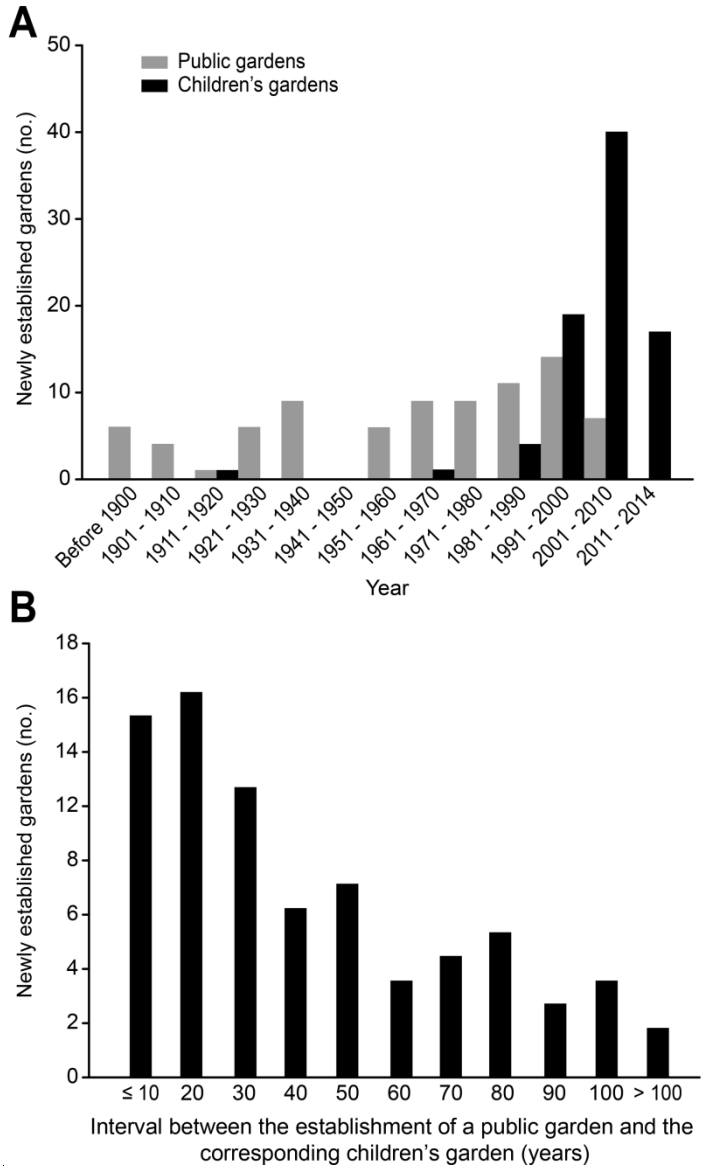

Fig. 3. The trends in the establishment of public gardens and children's gardens in the United States: The number of public gardens and children's gardens built before 1910 and after 1910 until 2014 in each decade (A), Trends in the time (years) elapsed after the building of public gardens until the establishment of their children's gardens (B).

The proportional area of children's gardens ranged widely, from less than 0.1% to more than 10.0%, with an average of 4.3% (SD of 13.9%). The children's gardens with the greatest proportional area were primarily located in eastern states, although some were located in central states (Fig. 4A). There were no statistically significant correlations between the sizes of public gardens and children's gardens. A more detailed distribution analysis via a histogram showed that most public gardens were less than 100 acres in size. Of these, most were at the smaller end of the range and were between 0 and 20 acres (Fig. 4B). An analysis of the sizes of children's garden showed a similar trend in that the data were skewed toward the lower end of the range, with a majority of children's gardens being less than 1 acre (Fig. 4C). A histogram of the proportional areas of children's gardens within their public garden (Fig. 4D) showed that these data were also heavily skewed to the smaller end of the range, with most below 5%. Within that range, as the proportional area grew smaller, the number of children's gardens increased, with the majority of children's gardens being less than 1% of the proportional area of public gardens. According to the research, children's gardens within botanical gardens are maintained as important spaces (AHS, 2005; Mattern, 1999; Taylor, 1994, Willison and Vergou, 2012). However, because there are large variations in the size of children's gardens and the

proportions of children's gardens within public gardens, the area of a children's garden does not seem to indicate its importance to the public garden. Thus, a better measure of the "importance" of the children's garden to the public garden may be each public garden's investment, both financial and programmatic, in its children's garden. Therefore, further related studies are needed.

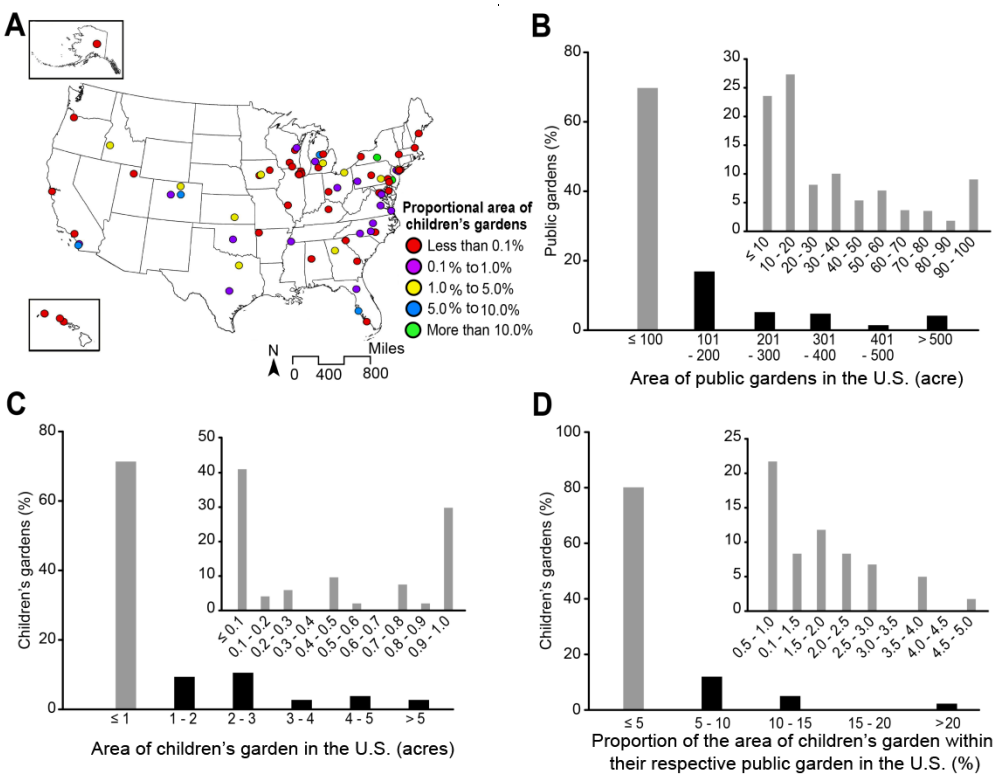

Fig. 4. Geographic distribution of children′s gardens in the United States according to the proportion (%) of space they occupy within the public gardens (A). The ground areas of the public gardens (B; inset = details of public gardens that are ≤100 acres; Public garden (%) = (number of public gardens of X acres / total number of public gardens) x 100) and of the children′s gardens (C; inset = details of children′s gardens that are ≤1 acre; Children's gardens (%) = (number of children's gardens of X acres / total number of children's gardens) x 100). The proportion of children′s gardens according to their ground area within the public gardens (D; inset = details of children′s gardens that make up ≤5 % of the public garden; Children's garden (%) = number of children's gardens / number of public gardens) x 100). 1 mile = 1.6093 km. 1 acre = 0.4047 ha.

To investigate the social interest in children's gardens over time, the number of news articles published about children's gardens was compared with the number of newly established children's gardens by year. Yearly data were collected beginning in the early 1990s because the number of public children's gardens began to increase in popularity at that time. The number of newly established children's gardens increased between the years of 1996 and 2005 and then decreased. Interestingly, the number of news articles about children's gardens dramatically increased between 2006 and 2010 (Fig. 5). This increase in the number of published articles about children's gardens would have been an effective way to inform the public about these new gardens and possibly to increase public interest.

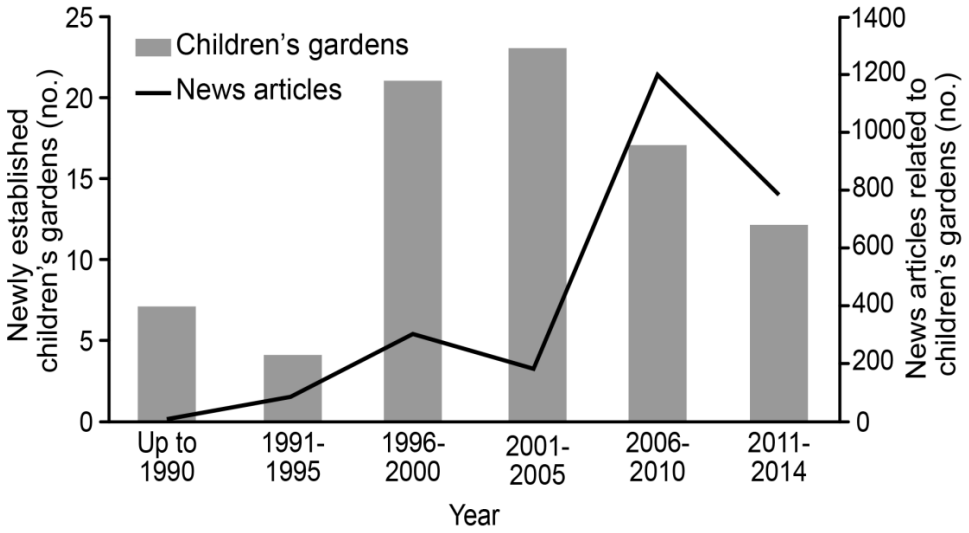

Fig. 5. The number of newly established children's gardens in the United States and the number of children's garden-related news articles published since 1990 in each 5-year time period. The news articles about children's gardens were found via Google, Inc. (1998a).

The results of *t*-tests in analyses relating demographic and socioeconomic factors to children's gardens showed that only per capita income ($P < 0.01$) had positive correlations with children's gardens; correlations with other factors did not reach statistical significance. This result is in accordance with previous reports that personal income influences the use of public services, such as park and recreation services (Scott and Jackson, 1996; Scott and Munson, 1994). On average, counties with children's gardens showed larger populations, more preschoolers and schoolchildren, and higher levels of education and personal income than counties without children's gardens did (Table 4). Similar results were found for 776 public gardens, which were significantly correlated with all of the examined demographic and socioeconomic factors (Table 5). It was found that the population, education level, and personal income level of each county affected the development of children's gardens and public gardens. There is a perception that gardens are primarily enjoyed by elite, middle-class people (Dodd and Jones, 2010). This perception may reflect the more common presence of children's gardens and public gardens in counties related to socioeconomic perspective.

Table 4. Relationship between the presence of public children's gardens at the county level and demographic and socioeconomic factors based on the *t*-test.

Variables	County	N	Mean	SD	*t*-test	*P*
Population	With CG[z]	82	697,089.21	1,255,401.72	1.422	0.157
	Without CG	62	462,852.84	699,916.35		
Population under age 5 years	With CG	82	49,202.67	95,403.51	1.321	0.189
	Without CG	62	32,592.55	54,086.72		
Population age 5 to 17	With CG	82	108,176.43	230,726.77	1.167	0.246
	Without CG	62	73,609.42	119,131.51		
Bachelor's degree	With CG	82	98,843.02	167,966.76	1.779	0.078
	Without CG	62	59,554.27	94,401.50		
Per capita income	With CG	82	28,761.01	6,419.53	2.683	0.008**
	Without CG	62	25,418.63	8,064.86		

[z]CG: Children's garden. **Significant at $P \leq 0.01$.

Table 5. Relationship between the presence of public gardens at the county level and demographic and socioeconomic factors based on the *t*-test.

Variables	County	N	Mean	SD	*t*-test	*P*
Population	With PG[z]	451	370,779.40	679,246.05	10.251	0.000***
	Without PG	2,689	42,469.13	84,781.24		
Population under age 5 years	With PG	451	25,651.19	50,989.41	9.494	0.000***
	Without PG	2,689	2,828.86	6,008.11		
Population age 5 to 17 years	With PG	451	58,829.46	119,673.14	9.132	0.000***
	Without PG	2,689	7,306.77	14,120.42		
Bachelor's degree	With PG	451	49,139.78	93,019.24	10.340	0.000***
	Without PG	2,689	3,773.81	13,234.50		
Per capita income	With PG	451	26,147.11	6,569.09	18.298	0.000***
	Without PG	2,689	20,132.99	4,859.61		

[z]PG: Public garden. ***Significant at $P \leq 0.001$.

Chapter 3. Education Programs in Public Children's Gardens

3.1. Methodology

3.1.1. Study design

To determine the curricula and foci of children's education programs offered by public children's gardens (i.e., public gardens with children's gardens) in the United States, this study surveyed 163 public gardens out of 776 public gardens and examined programs offered in public children's gardens in the United States. These gardens included 90 public children's gardens, 5 children's gardens under construction, and 38 children's gardens that were planned but not yet built.

This research classifies public gardens into two types: those with children's gardens (90) and those without children's gardens (73), the latter of which included those with children's gardens that were planned or under construction. In the present study, the websites of these 163 public gardens were visited from Aug. to Dec. 2014. The research target was limited to public gardens that listed public education programs on their website.

To study the topics and activities of each subject provided by children's education programs at public children's gardens and their proportions, only

annual programs offered in 2014 that listed either an informative title or a title and a description of the content of the program on their website were examined. In this study, "children" refers to individuals who are in grade six or lower, as follows: toddlers (<3 years of age), pre-kindergarteners (3–4 years), kindergarteners (5–6 years), first graders, (7 years), second graders (8 years), third graders (9 years), fourth graders (10 years), fifth graders (11 years), and sixth graders (12 years). The total number of children's education programs was determined. The programs were analyzed according to the keywords in the title and content, which were then categorized into topics and activities. Programs could be categorized into multiple topics and/or activities (Tables 6 and 7).

The method employed to categorize topics and activities was as follows. The topics were classified as natural sciences or arts and non-natural sciences. The topic of natural sciences (Kindersley, 2000) was further divided into biology, non-biology, and complex. The arts and non-natural sciences topic was divided into culture and general, according to previously described criteria (DeMarco et al., 1999; Miller, 2005). Additionally, based on previous categorizations (Braus and Wood, 1993; Chawla, 1994; Disinger, 1998; Subramaniam, 2003), these topics were further categorized as follows. Biology included contents about plants, animals, and microorganisms

(fungus and mold). Non-biology included climate (temperature, precipitation, and wind) and soil (dirt and fertilizer). Complex included ecology (the natural environmental ecology of earth organisms) and the environment (the general environment, such as earth and waste). Culture included art (design and color) and literature, and general included other educational topics, such as history and math. In total, 10 topics were identified. The activities of the programs were also categorized. Horticulture included gardening (indoor and outdoor gardening activities). Exploration included observation (garden walks and outdoor exploration) and guided tours (self-led and group tours). Art included visual arts (crafts, painting, and photography) and music (vocal and instrumental). Language arts included storytelling (listening to stories) and writing (creative writing or poetry). Practice included playing (games and physical activity) and hands-on activities (cooking and experiments), and event included exhibitions (museum or gallery tours) and performances (parties and musicals). The total number of activity categories was 11.

To examine the percentages of the target audience of children's education programs provided by the selected public children's gardens (90) compared with public gardens without children's gardens (73), the intended audiences were categorized into adults, youth, children and families based on information listed on the garden websites. Then, data from education

programs offered in 2014 were collected (Fig. 6). To examine the diversity of the programs, the geographical distribution and the topics and activities of the education programs of public children's gardens (90) and public gardens without children's gardens (73) were compared (Fig. 7). Additionally, a survey on the objectives (Fig. 8) and the types (Fig. 9) (Appendix 2) of children's education programs in children's gardens was also conducted. From July 2011 to Jan. 2012, the education coordinators and horticulture directors of the 776 public gardens initially aggregated by Kwon et al. (2015) were invited to participate in an online survey conducted via the Survey Monkey (2011) website. Additionally, a telephone survey was conducted twice (in July and Aug. 2014) to obtain supplemental information when the answers to the online survey were insufficient. The design and analysis of the results of the survey were based on discussions with 17 colleagues across the academic (professor), public (garden director and director of institution), and private (landscape designer and environmental educator) sectors (Appendix 3), as well as based on previous studies (Purcell 2010 and Lekies et al, 2006). Respondents from 163 public gardens in 43 states participated in the surveys. The proportion of children's education programs in each of the categories in each public children's garden was examined (Fig. 10). In addition, the frequency of each subject offered by the education programs for each age

group was examined (Fig. 12). Moreover, similar to research that has examined how garden activity programs generate a difference in environmental awareness at various age levels (Bradley et al., 1997; Skelly and Zajicek, 1998), the ages were divided into three main groups [preschool (toddler to kindergarten), lower-level elementary school (grades 1–3), and upper-level elementary school (grades 4–6)] to identify significant differences between the groups (Tables 8 and 9).

Additionally, the programs pertaining to plants and animals, which constituted the highest percentage, were again categorized according to the content listed on the website. Plant programs were divided based on the following topics: plant structure, plant physiology, plant uses, and plant characteristics. The animal programs were divided based on the following topics: arthropods, birds, reptiles, amphibians, fish, annelid, mollusks and mammals (Fig. 13).

Finally, the respondents to the survey were asked about improvements that should be made to children's gardens (Table 10) (Appendix 2). The survey was conducted using the same methods as those used for Figs. 3 and 4.

3.1.2. Data analysis

A multiple analysis method was employed to examine the percentage

of educational targets relative to the existence of a children's garden (Fig. 6), to determine the objectives of operating children's education programs (Fig. 8), to delineate types of children's education programs (Fig. 9), and to identify areas for improvement in children's education programs in public children's gardens (Table 10).

The frequency analysis method was used to analyze the frequency of topics and activities in children's education programs (Table 6 and 7), to analyze the diversity of children's education programs relative to the existence of a children's garden (Fig. 7C), to examine the program content in detail, and to determine the proportions of plant- and animal-related programs (Fig. 13).

The SigmaPlot program (version 13; Systat Software Inc., San Jose, CA) was employed to plot quartiles to study the proportions of topics and activities in the children's education programs provided by each public children's garden (Fig. 11). A cross-tabulation analysis was conducted using the Chi-square test to examine the relative differences in the topics and activities of education programs offered to different age groups (preschool, lower-level and upper-level elementary school) (Tables 8 and 9). All statistical analyses were conducted using SPSS (version 20.0 for Windows; IBM, Armonk, NY). The level plot function in R (version 3.1.2; R

Foundation, Vienna, Austria) was used to examine the distribution of topics and activities for each age group. A heat map was created and analyzed to visualize the data (Fig. 12).

A spatial analysis technique based on geographic information system (GIS) data was employed to analyze the geographical distribution of the diversity of children's education programs in the United States (Fig. 7A and 7B). The location data of public gardens was projected using Albers equal-area conic projections after identifying the gardens' longitudes and latitudes from their addresses. All GIS analyses were conducted using ESRI ArcGIS (version 10.0; ESRI, Redlands, CA)

3.2. Results and Discussions

3.2.1. Education programs in public gardens

Of the public children's gardens (90), 76 offer public education programs. A major target audience of these programs is children at 93.4% (71) of the public gardens with education programs, followed by adults at 89.5% (68), families at 46.1% (35), and youth at 35.5% (27). Among the 73 public gardens that do not have children's gardens, 42 offer public education programs. The rank order of the target groups of these programs is children at 85.7% (36), adults at 81.0% (34), families at 26.2% (11), and youth at 16.7% (7) (Fig. 6). The results demonstrate that a major target of public education programs is children. However, in public children's gardens, the proportions of each target audience are at least approximately 8.0 to 19.0 percentage points higher than in public gardens without children's garden. The results from Purcell's study (Purcell et al., 2010), which examined education personnel at public horticultural institutions and their education programs, showed that the target audiences were adults (35.4%), children (35.2%), families (14.9%), and adolescents (8.9%). These figures are similar to the results from the present study. However, the present study further shows that the education programs offered by public children's gardens provide more activities than those offered by public gardens without children's gardens.

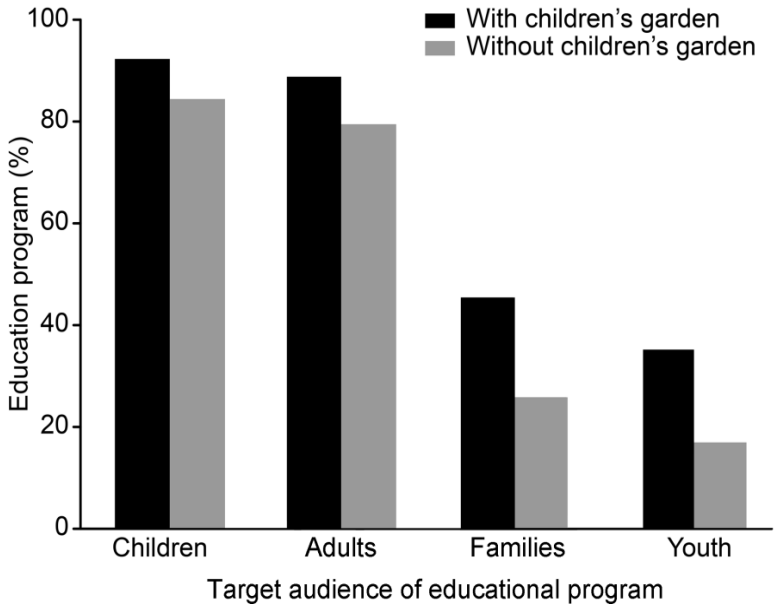

Fig. 6. The percentage of each of the four target audiences of education programs of public gardens with and without children's gardens in the United States. Data were collected from the websites of 76 public children's gardens and 43 public gardens without children's gardens that offered education programs.

The subject (21 total subjects: classified into 10 topics and 11 activities) diversity of children's education programs provided by public children's gardens and public gardens without children's gardens was compared, as described in the methodology. For public children's gardens (67) that operate children's programs on an annual basis, the average number of programs was 10±3.3 (SD), with a maximum of 18 programs and a minimum of four programs. Thirty-five (52.2%) public children's gardens had greater than or equal to the average number of programs. These gardens were evenly distributed across the United States (Fig. 7A). However, for public gardens (34) without children's gardens that offered children's education programs annually, the average number of the combined subjects was 5.6±2.4 (SD), with a maximum of 12 programs and a minimum of two programs. Seventeen gardens had the average number of subjects or more, and 17 gardens had fewer than the average number of subjects. Those with an above average number of subjects were distributed mainly in the East (Fig. 7B). The present study performed a similar study to that of Kwon et al. (2015) regarding the demographic and socio-economic factors that affect the development of public children's gardens. Additionally, as an expansion of the previous study, the size and opening year of both the public gardens and their children's garden were examined. However, no relationship between the

demographic or socio-economic factors, size or opening year and the composition of programs was observed. Thus, the diversity of children's education programs might depend on educators' willingness to offer a wide range of programs. This idea requires further examination. Furthermore, an analysis of the total numbers of the 10 topics and 11 activities in each program showed that there was greater subject diversity in children's education programs in public children's gardens than in public gardens without children's gardens with respect to topics (an average of 5.0± 2.0 (SD) subjects vs. 2.8±1.6 (SD) subjects, respectively) and activities (5.0±1.8 vs. 3.0±1.6 (SD), respectively). This result shows that diverse programs are more commonly implemented in public children's gardens than in public gardens without children's gardens (Fig. 7C). The results also show that children's education programs provided by public children's gardens offer a greater variety of subjects.

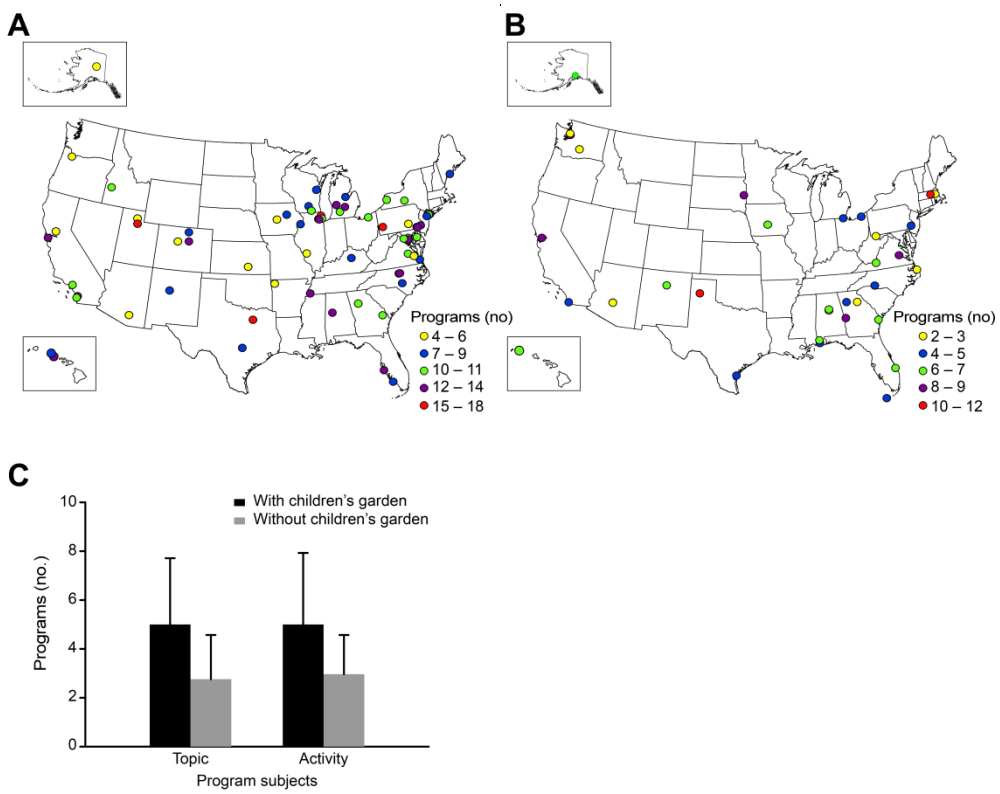

Fig. 7. The geographical distribution of the number of program subjects provided by public children's gardens (A) and public gardens without children's gardens (B) as well as the differences in the number of program subjects offered depending on the presence of children's gardens (C). Subject programs were classified into 10 topics and 11 activities, as described in the methodology.

3.2.2. Analysis of children's education programs in public children's gardens

Of the 71 public children's gardens that offered children's education, 67 responded. The respondents answered a question regarding the purpose of operating children's education programs. Their responses were evaluated using multiple answer analysis. The answers were as follows, in descending order: connecting to nature (37 times), fostering an awareness of the environment (35 times), learning about plants and science (28 and 16 times, respectively), and learning various subjects (22 times). This result shows that the most significant purpose of such education programs is to offer experience-based learning through contact with nature (Fig. 8). Similarly, Maller and Townsend (2006), who researched children's mental health and well-being through nature experience activities (nature-based programs provided by schools), found that 50.8% of participants stated that the purpose of the programs was for children to connect with nature. Thus, both the providers and beneficiaries of such programs expect to pursue the same purpose.

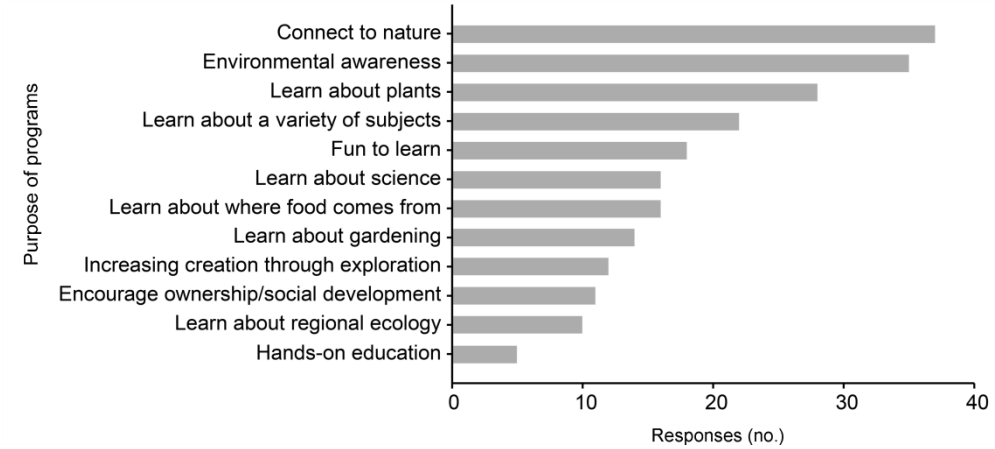

Fig. 8. The purpose of operating children's education programs in public children's gardens in the United States. Multiple responses were collected from 67 public gardens through online or phone survey.

In the survey section regarding the types of children's education programs, the group types and children's ages were recorded based on the respondents' self-reported answers and information found on the websites of the sampled public gardens. The most frequently reported group type was school groups (29%), followed by preschool groups (including kindergarteners and preschoolers aged 1–6 years) (20%), and camp and scout groups (6%) (Fig. 9). Although camps and summer camps may be quite varied, the common factor is that all of the education programming reported by the gardens as "camp" occurred in the public gardens sampled. Additionally, for the "scout" type, all of these types of education programs have Boy & Girl Scout audiences. Our results are similar to those reported for youth-oriented programs provided by public horticultural institutions (Purcell et al., 2010). In these institutions, school group programs (71.2%) represented the most active type of program in operation. The other child-centric programs were camp groups (23.2%) and afterschool groups (12.0%).

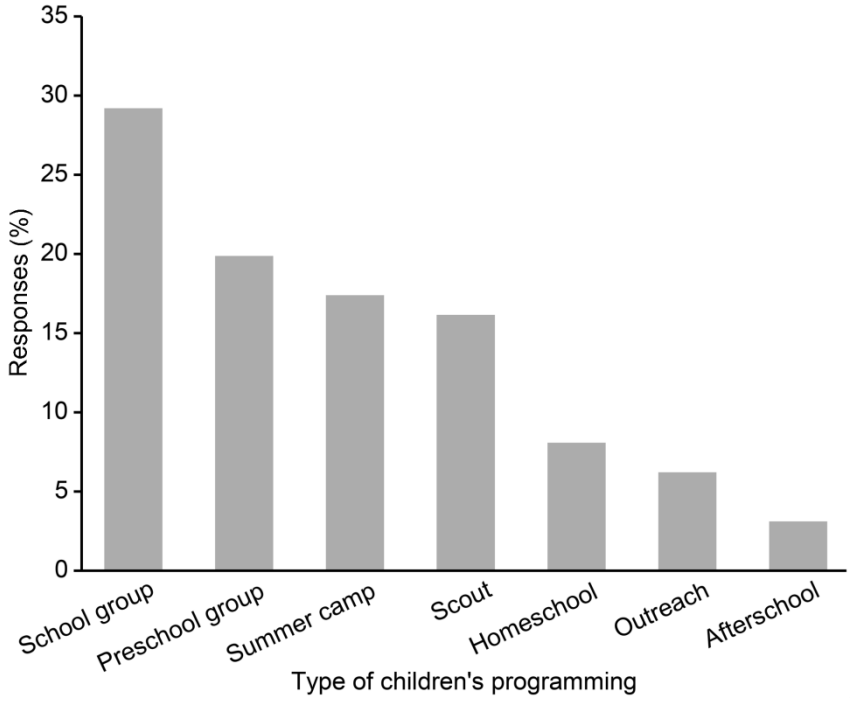

Fig. 9. The types of children's education programs provided by public children's gardens in the United States were collected from 67 public gardens through online or phone surveys.

Among public children's gardens that offer children's education programs (71), 67 public gardens held an annual schedule of programs during 2014. These gardens offered a total of 1,270 children's education programs (Fig. 10) The average number of programs was 19±18 (SD) (maximum = 91 and minimum = 3), with most gardens offering less than 10 programs. The average number of programs related to the 10 topics and 11 activities was calculated relative to the total number of programs. The average number of programs offering each topic was 19±18 (SD), with a maximum of 102 and a minimum of 1. The average number of programs offering each activity was 12±9 (SD), with a maximum of 44 and a minimum of 2.

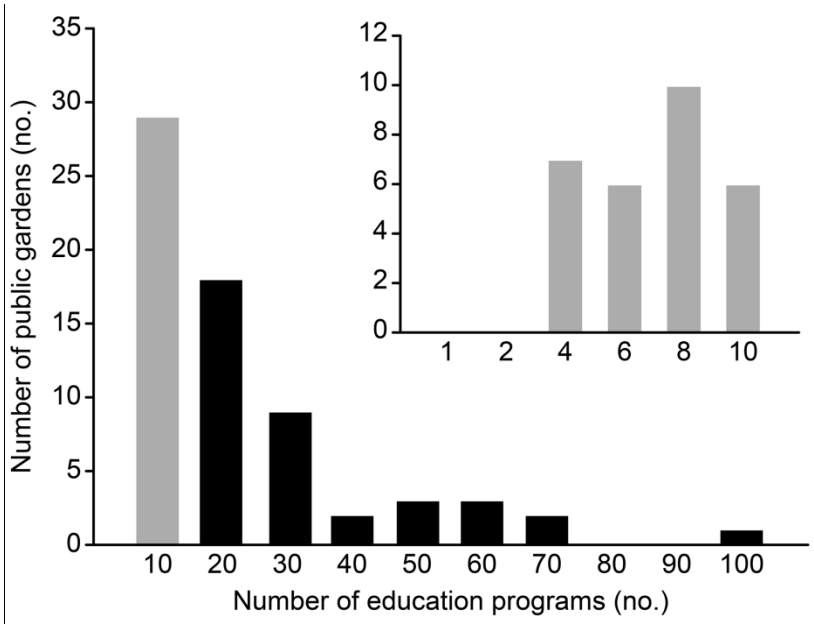

Fig. 10. Numerical distribution of children's education programs offered in public children's gardens in the United States (inset = details of public gardens offering <10 children's education programs).

The total number of programs offered by the 67 public children's education programs were categorized by topic: plants (39.1%); animals (22.0%); art (11.3%); ecology (8.6%); environment (5.7%); literature (4.3%); other categories (4.2%), such as math and history; soil (2.2%); climate (1.8%); and microorganism (0.9%) (Table 6).

Plants were the most common topic, with an average representation of 42.7% (Table 6), but the proportion of plant programs varied widely across public gardens. Some public gardens focused 100% of their programs on plants, while plant programs in gardens in the bottom quartile represented less than 32% of the total number of programs. Furthermore, the public garden with the lowest percentage of plant-related programs (9%, representing one program) had a higher percentage of art programs (36%, representing four programs) (Fig. 11A). Public children's education programs all offered some type of plant-related program. Animal-related programs ranked second (24.1%) (Table 6) after plant-related programs. In one public garden, 86% of the topics were animals, while animal-related programs in public gardens in the bottom quartile constituted less than 12% of the total programs. Some gardens had no animal-related programs (Fig. 11 A). Only nine of the 67 public children's gardens offered microorganism-related subjects, and these nine gardens only offered one or two of these

programs. Thus, microorganism was the least common subject among all the programs (Fig. 11A). Ecology programs followed animal-related programs in prominence. While one public garden devoted 67% of its education programs to ecology, other gardens did not have any ecology programs (Table 6, Fig. 11A). Climate, soil, and environment programs, which fall under the non-biology and complex topics, represented as much as 33% of the programs in some public gardens. However, more than half of the public gardens did not offer these subjects (Fig. 11A). This result indicates that these subjects are not typically included as part of general education programs in public children's gardens. Thus, the environmental aspects of public gardens allow them to provide more programs related to biological subjects, such as plants and animals. However, public gardens also offer subjects relating to other natural sciences and to arts and non-natural sciences, such as art, literature, and other categories (e.g., math and history). In the existing scholarship on environmental education programs provided by children's gardens (Braus and Wood, 1993; Miller, 2005), environmental education mainly focuses on scientific education. However, a full educational scope should encompass not only science but also math, languages, art, culture, and politics (i.e., virtually all subjects) in a comprehensive way. This conclusion is also reflected in the current research.

Arts and non-natural sciences programs, including art, literature, and other categories, represented more than 55% of the programs in some public gardens. Art constituted an average of 12.9% of the programs (Table 6), and one public garden devoted 67% of its programs to art. Additionally, half of the public gardens had 11% of their programs devoted to art. Furthermore, more than half of the public gardens did not include either literature or other programs (Fig. 11A). The results also demonstrated that art-related education programs are among the top three programs offered by public gardens, indicating that such programs enable children to connect with nature through art. The reason why art was ranked third after plants and animals is explained by studies arguing that art is an important subject that relates to other subjects within a comprehensive education. Children's education programs that include art significantly increase children's creativity (Miller, 2007). This principle also applies to children's education programs offered by public gardens.

The result of the topic analysis indicates that every public garden offered at least one plant-related program among the 10 topics, whereas the other nine topics were not necessarily offered. Due to the characteristics of public gardens, natural science programs were offered more frequently than arts and non-natural sciences programs. In some public gardens, this trend

was reversed, indicating that the composition of education programs varies across public gardens

Table 6. The proportions of topics in children's education programs provided by public children's gardens in the United States.

Category	Natural sciences							Arts and non-natural sciences		
Division	Biology			Non-biology		Complex		Culture		General
Subject	Plant	Animal	Microorganism	Climate	Soil	Ecology	Environment	Art	Literature	Other
Total (no.)	496	280	11	23	28	109	73	144	54	53
Total (%)[z]	39.1	22.0	0.9	1.8	2.2	8.6	5.7	11.3	4.3	4.2
Avg (%)[y]	42.7	24.1	1.0	1.5	2.3	7.8	4.8	12.9	6.1	4.4

[z] The percentage of programs offered on the specific topic relative to the total number (n = 1,270) of children's education programs.

[y] The percentage of the programs offered on the topic by each public children's garden was calculated relative to the total number of programs that the garden offered. The average of this percentage across all gardens is presented.

Table 7. The proportions of activities in children's education programs provided by public children's gardens in the United States.

Division	Horticulture	Exploration		Art		Language art		Practice		Event	
Subject	Gardening	Observation	Guided tour	Visual art	Music	Story telling	Writing	Playing	Hands-on activities	Exhibition	Performance
Total (no.)	75	217	59	183	43	81	13	75	66	7	16
Total (%)[z]	5.9	17.1	4.6	14.4	3.4	6.4	1.0	5.9	5.2	0.6	1.3
Avg (%)[y]	8.6	20.3	6.7	18.7	4.9	8.1	0.8	7.7	5.8	0.8	1.5

[z] The percentage of programs offered on the specific activity relative to the total number (n = 1,270) of children's education programs.

[y] The percentage of the programs offered on the specific activity by each public children's garden was calculated relative to the total number of programs that the garden offered. The average of this percentage across all gardens is presented.

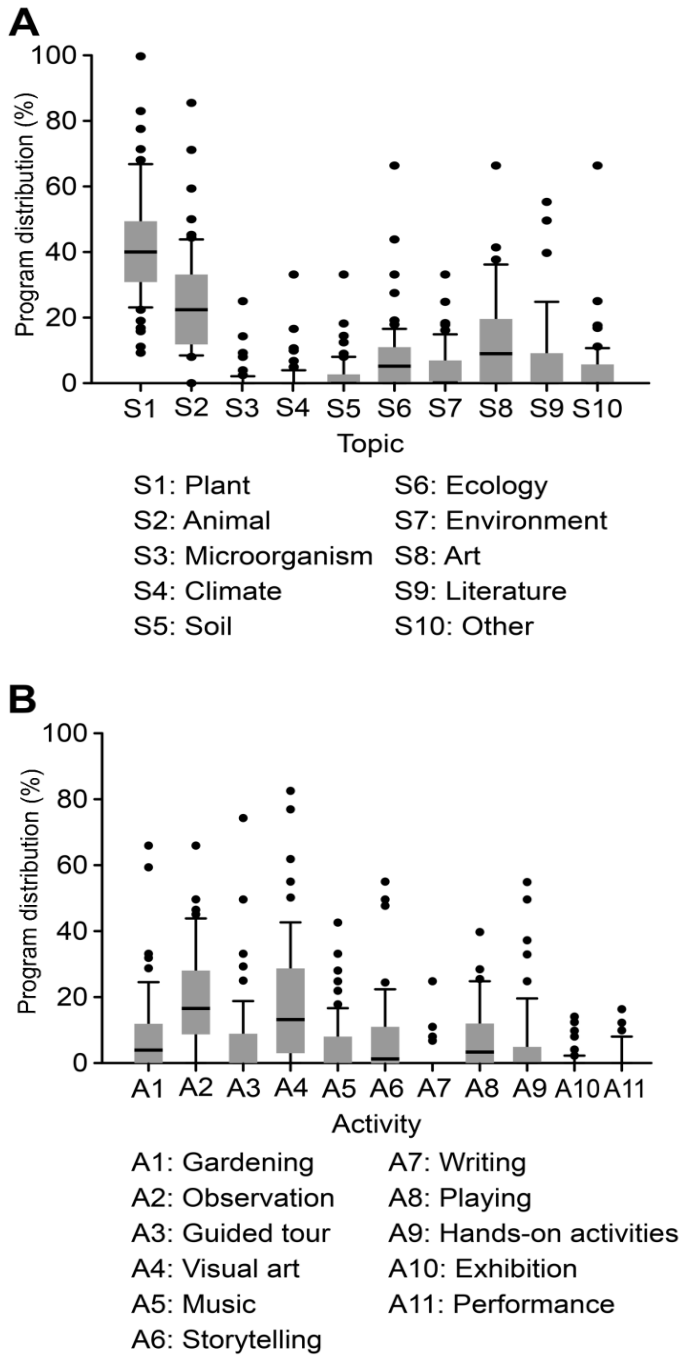

Fig. 11. The distribution of children's education program subjects [10 topics (A) and 11 activities (B)] provided by each public children's garden in the United States.

When the total number of programs offered by the 67 public children's education programs were categorized by activity, the activities were ranked as follows: observation (17.1%), visual art (14.4%), storytelling (6.4%), gardening (5.9%), playing (5.9%), hands-on activities (5.2%), guided tours (4.6%), music (3.4%), performance (1.3%), writing (1.0%), and exhibition (0.6%) (Table 7). When the proportion of each activity provided by children's education programs in each public garden was analyzed, observation constituted an average of 20.3% (Table 7). Some public gardens had programs entirely composed of observation activities, while those in the bottom quartile had observation activities that represented less than 9% or even none of the programs (Fig. 11B). Observation activities within public gardens serve as a strong motivation for children to voluntarily research and conduct self-directed learning through their connection with nature (Wake, 2007). These activities represent the greatest environmental advantages that public gardens can offer to children. Following observation, visual art ranked the highest, with an average of 18.7%. However, while the maximum percentage was 83% in some public gardens, less than 4% of the programs in the bottom quartile included visual art, and some gardens had no such programs (Table 7, Fig. 11B). Contact with art during childhood is important as a learning experience that not only offers pleasure but also increases one's physical development through motion (drawing and painting) and other

motor activities (Fox and Berry, 2008; Froebel, 1974). Public gardens' ability to offer various natural materials for use in such activities explains the relatively high proportion of these activities found in the present study. Additionally, the average percentages of these activities were as follows: gardening (8.6%), storytelling (8.1%), playing (7.7%), guided tours (6.7%), hands-on activities (5.8%), music (4.9%), performance (1.5%), writing (0.8%), and exhibition (0.8%) (Table 7).

These activities have been described by previous research on interdisciplinary environmental education (Braus and Wood, 1993). However, in this study, gardening activities, which one would expect to be predominantly offered at public gardens based on their environmental aspects, were not the primary programs offered as part of the education programs at public gardens. Our results are consistent with previous studies that showed that school gardening conveys many positive benefits to children. Hence, interest in gardening as part of an education curriculum in school has been increasing (DeMarco et al., 1999; Miller, 2007). Therefore, gardening-related activities can be provided to children by schools to support their education.

The results show that among the 11 activities, no activity was offered at every public children's garden. However, public gardens experiment with various combinations of programs that incorporate nature and other topics to

take advantage of the experience of nature that they can offer. Some studies have emphasized comprehensive education within gardens (Braus and Wood, 1993; Disinger, 1998; Eames-Sheavly, 1998) and have concluded that implementing various activities would not only heighten children's awareness of the natural environment but also heavily influence various aspects of their physical and mental development.

The frequency distribution of children's education program topics and activities for each age group was examined using heat map analysis (Fig. 12A). Additionally, the proportions of children's education program topics and activities were evaluated based on the children's ages using cross-tabulation analysis (Tables 8 and 9). However, differences existed in each age group. Plant programs were more common in the lower-level elementary (grades 1–3) group (83.6%) than in the preschooler (toddlers, pre-kindergarten, and kindergarten) group (55.2%) or in the upper-level elementary (grades 4–6) group (63.7%). This result was statistically significant ($\chi^2 = 38.838$, $P < 0.001$) (Table 8). Compared with the other age groups, grades 1–3 (72.1%) were offered a higher frequency of animal programs. This difference was also statistically significant ($\chi^2 = 33.028$, $P < 0.001$) (Fig. 12A, Table 8). Art, which ranked below plants and animals, was primarily offered to preschool and upper-level elementary students but was also a frequent topic in programs offered to lower-level elementary school students (48.3%). Microorganism, soil, ecological, and environmental topics were more commonly offered to upper-level elementary school students. Additionally, climate-related and other topics were more commonly offered to lower-level elementary (grades 1–3) school students (Fig. 12A, Table 8). A study that compared organism-centered science education curricula and textbooks for elementary schools in the United States found that third

graders learned about the classification of plants and animals; fourth graders learned about life cycles and growth; and fifth graders learned about organs and the environment, the structure of organisms, and environmental change. This result indicates that as students advance through elementary school, they learn more about the environment and about organismal structures. This finding is consistent with the findings of the present study, which show that microorganism, soil, ecological, and environment programs were more often offered to upper-level elementary students (National Governors Association Center for Best Practices and Council of Chief State School Officers, 2010; Seo, 2013).

Observation and visual art, which ranked as the most common subjects in children's education programs, were distributed heavily and evenly across children from preschool to elementary school age, except for toddlers and sixth graders. Additionally, for both of these subjects, the frequency exceeded 55% at the lower level and reached statistical significance (observation: $\chi^2 = 12.350$ $P < 0.01$; art: $\chi^2 = 16.155$ $P < 0.01$) (Fig. 12B, Table 9). Gardening was offered to children of preschool and especially kindergarten age, but it was more commonly offered to children in lower-level elementary school (40.8%). Activities such as storytelling and music, which do not require advanced levels of understanding but may be fun and interesting, were more common among children who were younger than

lower-level elementary school students (Fig. 12B, Table 9). Activities in which participants performed a hands-on activity independently, such as cooking and experimentation, and writing were commonly found in programs targeted at upper-level elementary school students (Fig. 12B).

This result is consistent with previous research by Waliczek et al., (2001), who examined the effect of grade on attitude toward school and interpersonal relationships related with green activities. Their results showed that children who participated in green activities were older and thus able to work more independently compared to younger children, who work under more supervised conditions, such as in the storytelling or music activities found in the present study. However, in the present study, gardening programs were more frequently offered to young children. This result is consistent with previous research that showed that green activities offered to younger students produce greater improvements in environmental attitudes in diverse environments (Jaus, 1984; Skelly and Zajicek, 1998).

Most of the topics and activities provided by public gardens were developed for kindergarteners and lower-level students (grades 1–3), and the frequency of programs steadily decreased starting in grade 5. Preschoolers need their parents' or instructors' help because they lack cognitive and physical skills (Rimm-Kaufman et al., 2000). Thus, fewer programs catered to preschoolers, especially those under kindergarten age. In a study on the

influence of gardening and environment-related education on one's attitude toward such education, more positive cognition was observed in second grade than in fourth grade (Skelly and Zajicek, 1998). Many similar studies have shown that lower-level students display much more positive development as a result of environment-related subjects than do higher-level students (Bradly et al., 1997; Harvey, 1989a, 1989b; Jaus, 1984; Ramsey and Rickson, 1976). These results indicate that earlier education has a more positive impact, which explains why more of the programs in the present study concentrate on younger children.

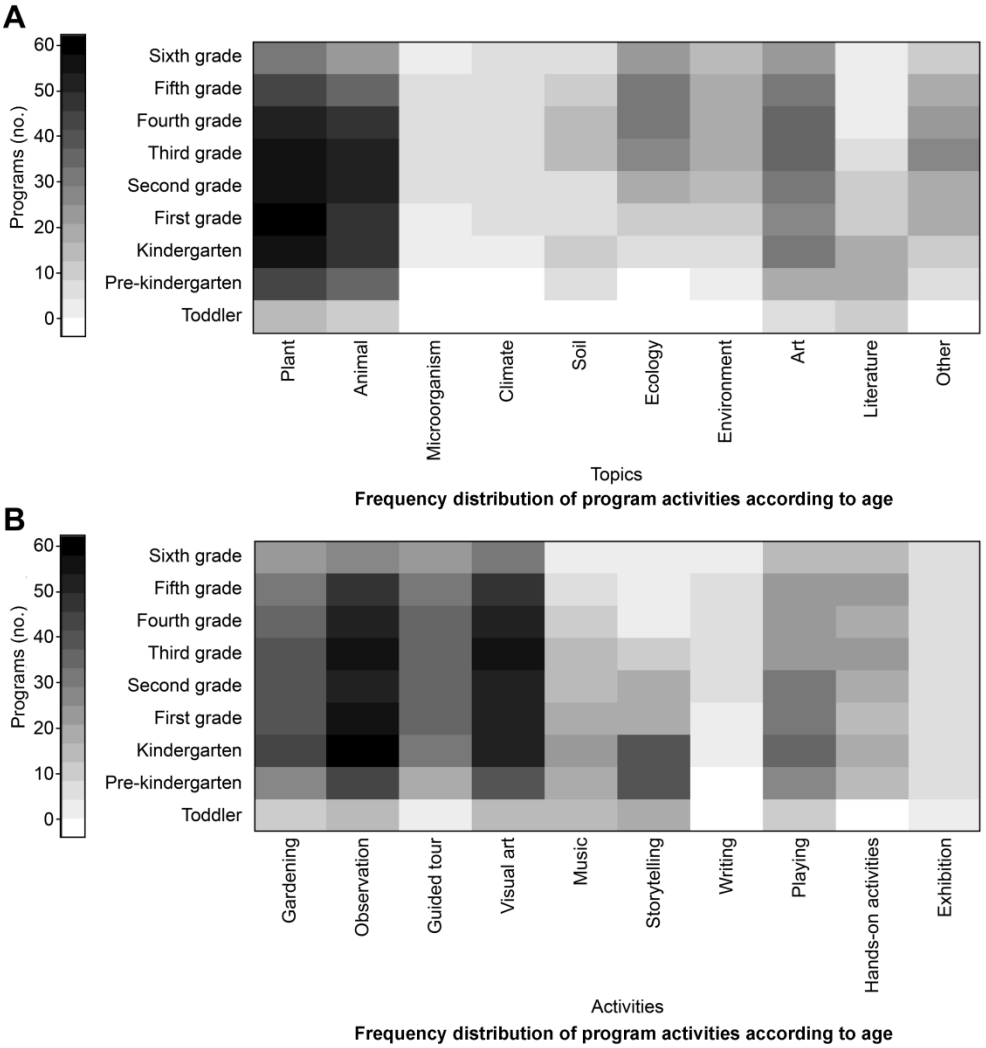

Fig. 12. The frequency distribution of children's education program subjects of 10 topics (A) and 11 activities (B) provided by public children's gardens with respect to target age group.

Table 8. Comparison of the topic of children's education programs provided by public children's gardens in the United States by age group using cross-tabulation analysis.

Category	Subject[z] offered (Yes/No)	Age group			Total [no. (% of total)]	Chi-square (*P*)
		Preschool[y]	Lower-level elementary[x]	Upper-level elementary[w]		
		[no. (%)]	[no. (%)]	[no. (%)]		
Plant	Yes	111 (55.2)	168 (83.6)	128 (63.7)	407 (67.5)	38.838
	No	90 (44.8)	33 (16.4)	73 (36.3)	196 (32.5)	(0.000***)
Animal	Yes	90 (44.8)	145 (72.1)	104 (51.7)	339 (56.2)	33.028
	No	111 (55.2)	56 (27.9)	97 (48.3)	264 (43.8)	(0.000***)
Micro-organism	Yes	2 (1.0)	15 (7.5)	18 (9.0)	35 (5.8)	13.164
	No	199 (99.0)	186 (92.5)	183 (91.0)	586 (94.2)	(0.001**)
Climate	Yes	4 (2.0)	19 (9.5)	18 (9.0)	41 (6.8)	11.044
	No	197 (98.0)	182 (90.5)	183 (91.0)	562 (93.3)	(0.004**)
Soil	Yes	16 (8.0)	28 (13.9)	31 (15.4)	75 (12.4)	5.756
	No	185 (92.0)	173 (86.1)	170 (84.6)	528 (87.6)	(0.056)
Ecology	Yes	7 (3.5)	55 (27.4)	82 (40.8)	144 (23.9)	89.988
	No	194 (96.5)	146 (72.6)	119 (59.2)	459 (76.1)	(0.000***)
Environment	Yes	8 (4.0)	42 (20.9)	50 (24.9)	100 (16.6)	35.772
	No	193 (96.0)	159 (79.1)	151 (75.1)	503 (83.4)	(0.000***)
Art	Yes	57 (28.4)	97 (48.3)	87 (43.3)	241 (40.0)	17.791
	No	144 (71.6)	104 (51.7)	114 (56.7)	362 (60.0)	(0.000***)
Literature	Yes	48 (23.9)	24 (11.9)	8 (4.0)	80 (13.3)	35.050
	No	153 (76.1)	177 (88.1)	193 (96.0)	523 (86.7)	(0.000***)
Other	Yes	18 (9.0)	57 (28.4)	52 (25.9)	127 (21.1)	26.952
	No	183 (91.0)	144 (71.6)	149 (74.1)	476 (78.9)	(0.000***)

[z]Indicates the group of programs offering (Yes) or not offering (No) that activity

[y]Ages 1–6 years (toddler, pre-kindergarten, kindergarten)

[x]Ages 7–9 years (grades 1–3)

[w]Ages 10–12 years (grades 4–6)

,* significant at $P < 0.01$, 0.001, respectively

Table 9. Comparison of the activities of children's education programs provided by public children's gardens in the United States by age group using cross-tabulation analysis.

Category	Subject[z] offered (Yes/No)	Age group			Total [no. (% of total)]	Chi-square (*P*)
		Preschool[y]	Lower-level elementary[x]	Upper-level elementary[w]		
		[no. (%)]	[no. (%)]	[no. (%)]		
Gardening	Yes	55 (27.4)	82 (40.8)	60 (29.9)	197 (32.7)	9.334
	No	146 (72.6)	119 (59.2)	141 (70.1)	406 (67.3)	(0.009**)
Observation	Yes	81 (40.3)	114 (56.7)	87 (43.3)	282 (46.8)	12.350
	No	120 (59.7)	87 (43.3)	114 (56.7)	321 (53.2)	(0.002**)
Guided tour	Yes	35 (17.4)	71 (35.3)	61 (30.3)	167 (27.7)	17.159
	No	166 (82.6)	130 (64.7)	140 (69.7)	436 (72.3)	(0.000***)
Visual art	Yes	73 (36.3)	113 (56.2)	90 (44.8)	276 (45.8)	16.155
	No	128 (63.7)	88 (43.8)	111 (55.2)	327 (54.2)	(0.001**)
Music	Yes	40 (19.9)	31 (15.4)	13 (6.5)	84 (13.9)	15.685
	No	161 (80.1)	170 (84.6)	188 (93.5)	519 (86.1)	(0.000***)
Storytelling	Yes	67 (33.3)	32 (15.9)	5 (2.5)	104 (17.2)	67.369
	No	134 (66.7)	169 (84.1)	196 (97.5)	499 (82.8)	(0.000***)
Writing	Yes	2 (1.0)	9 (4.5)	9 (4.5)	20 (3.3)	5.068
	No	199 (99.0)	192 (95.5)	192 (95.5)	583 (96.7)	(0.079)
Playing	Yes	52 (25.9)	61 (30.3)	40 (19.9)	153 (25.4)	5.833
	No	149 (74.1)	140 (69.7)	161 (80.1)	450 (74.6)	(0.054)
Hands-on activities	Yes	23 (11.4)	38 (18.9)	40 (19.9)	101 (16.7)	6.161
	No	178 (88.6)	163 (81.1)	161 (80.1)	502 (83.3)	(0.046*)
Exhibition	Yes	11 (5.5)	11 (5.5)	11 (5.4)	33 (5.5)	0.000
	No	190 (94.5)	190 (94.5)	190 (94.5)	570 (94.5)	(1.000)
Performance	Yes	19 (9.5)	24 (11.9)	13 (6.5)	56 (9.3)	3.583
	No	182 (90.5)	177 (88.1)	188 (93.5)	547 (90.7)	(0.167)

[z:]Indicates the group of programs offering (Yes) or not offering (No) that activity

[y:]Ages 1–6 years (toddler, pre-kindergarten, kindergarten)

[x:]Ages 7–9 years (grades 1–3)

[w:]Ages 10–12 years (grades 4–6)

*,**,*** significant at $P < 0.05$, 0.01, 0.001, respectively

The detailed contents of programs on plants and animals, which composed more than 20% of children's education programs offered by public children's gardens, were analyzed. Plant-related programs were categorized into four groups. "Plant structure," which explains plant components, constituted approximately 45% of the plant programs. "Plant characteristics", which explains plants as categorized by their climate ecology (e.g., tropical and desert plants), constituted 24.7% of plant programs. "Plant uses", which teaches how plants are used in everyday life, constituted 21.5% of plant programs. Finally, "plant physiology", which covers plant photosynthesis, transpiration, and respiration, constituted 9.1% of plant programs (Fig. 13A). As in other research that addresses science education programs in elementary schools in the United States, lower-level elementary school students learned about the structure of plants, while upper-level elementary school students learned about plant characteristics, uses, and physiology. Thus, this difference between the education provided to different age levels is reflected both in the textbooks that are used at these levels and the programs offered in public children's gardens (Kim, 2005; Seo, 2013). Among animal-related programs, arthropod programs ranked the highest (at 34.6%), followed by bird (15.4%), reptile (13.9%), and amphibian programs (10.6%) (Fig. 13B). When one study asked children about their favorite location in children's gardens, the highest-ranked area was the place where they could observe

their favorite animals, such as butterflies (which are arthropods) and birds. This result is reflected in children's education programs and in attempts to organize programs according to children's preferences (Midden and Chambers, 2000).

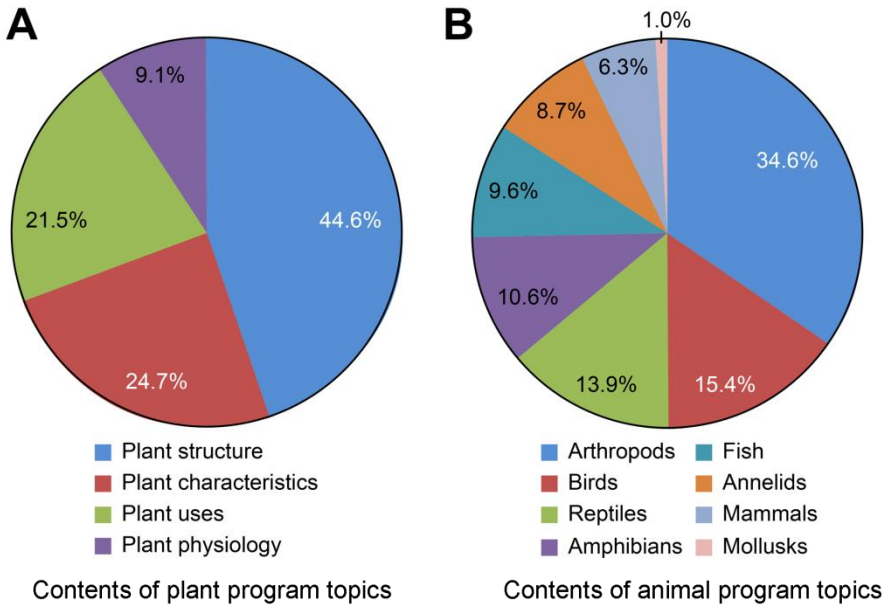

Fig. 13. The detailed contents of plant (A) and animal (B) programs provided by public children's gardens in the United States.

The 61 public children's gardens that responded to the survey on measures to improve children's education programs stated that the variety of topics should be increased (50) (Table 10). This result is similar to the results of a research project that asked adolescents about how a children's garden can be improved. One of their ideas was to offer a wide variety of programs (Lekies et al., 2006). Another study on activating adolescent-centered education programs in public garden institutions concluded that "providing a range of engaging activities" could be an option (Purcell et al., 2010). These similar conclusions indicate that the aims of institutions with existing nature and experience programs and environmental education are similar. Another study stated that the evaluation of programs and an increase in the number of employees should be taken as measures of improvement (Lekies et al., 2006; Steil and Lyons, 2009). The present study similarly showed that after offering a greater variety of topics, program evaluations to improve programs (38) and hiring more staff (22) could serve as improvement measures. Other answers included stronger volunteer-led instruction, the creation of subject sites, the presence of a full-time educator and more training for staff. As the conclusion of this study shows, the programs provided by public children's gardens are diverse. when an individual public garden is considered, the distribution of programs is disproportionate, implying that additional measures to diversify programs should be taken.

Table 10. Proposed measures for improvement for children's education programs: responses by education coordinators and horticulture directors in public children's gardens in the United States (multiple responses, n = 61).

Categories	No. responses
More variety in program topic areas	50
Program evaluation to improve program	38
More staff/instructors	22
Programs for special needs	20
Other	3

Chapter 4. Conclusions

The status of public children's gardens and their education programs in the United States was investigated in this study. Information obtained from online surveys and census data were used to characterize the distribution and development of public children's gardens using spatial analysis and mapping methods. Online survey and statistical tools were also used to examine the status of children's education programs offered by public children's gardens, to evaluate improvement plans, and to analyze educational implications. The main results and findings of this study are as follows.

First, children's gardens are nearly evenly distributed among public gardens, and most children's gardens were planned and established after the associated public gardens were created. The number of public children's gardens in the U.S. is expected to increase in the near future. However, based on the trends observed in this study, compared with private gardens, fewer public gardens are expected to be built in the United States in the near future. It is anticipated that children's gardens will continue to be built in the private sector and in public places, such as community gardens, hospitals, and schools, to meet the rising demand for them (Birky, 2009; Waliczek et al., 2000; Whitehouse et al., 2001).

Second, from a demographic and socioeconomic perspective that considers population, educational levels and income, counties with higher

incomes have more children's gardens. This result implies that upper- and middle-class people who have high incomes enjoy their outdoor activities in public gardens and that they are able to donate to public children's gardens.

Third, a major target of public education programs in these public gardens was children. Furthermore, children's education programs in public children's gardens had higher subject diversity. This result is indicative of the effort to offer a greater variety of children's education programs by developing public children's gardens.

Fourth, in this study, biological topics and observation-based activities were the main constituents of the programs. This result is in accordance with the natural environment aspects of public children's gardens. However, the subject diversity in the children's education programs offered by public children's gardens reflects not only the importance of science-associated programs but also the emphasis that public children's gardens place on comprehensive education.

Fifth, many programs actively offer environmental education to young children, but the number of programs decreases as children advance to the upper grades. This result indicates that public education programs for children are primarily directed toward children learning about the natural environment at a young age. This phenomenon is probably observed because this is the age at which children are developing various abilities.

Sixth, the results of this study demonstrate that the program subjects offered in public children's gardens are related to school curricula. This may be beneficial for schoolteachers because these gardens can provide an educational space where children can learn a variety of subjects through direct experience.

Finally, the observed trends in the composition of program offerings are markedly different across gardens. The program composition in an individual garden is often disproportionate, which is one reason why education coordinators reported that an increased variety of subjects is necessary to improve children's education programs. Therefore, to motivate children's curiosity and interest using children's gardens located in public gardens, it is important to diversify the natural environmental experiences of education programs.

According to the results of the online survey, children's gardens serve as multifunctional places for urban children. As urbanization becomes more extensive, children can visit these gardens with their families, enjoy themselves, rest in a natural setting, and experience and explore nature. With renewed public interest, the growth of children's gardens in public areas is likely to continue.

A possible limitation of this study is that the findings may not represent the true status of children's and public gardens because primarily Internet

searches and online surveys, which may have overlooked vital information, were used to conduct data collection. Additional studies are needed to incorporate missing information and to better describe the status of children's gardens, which are influenced by various socioeconomic and environmental factors, and their education programs.

The findings of this study on children's education programs may be useful for educators, researchers and teachers who plan children's education programs and for countries, including those in Asia, that are in the initial stages of Establishing public children's gardens and developing their education programs. Public children's gardens should be considered necessary and active places for natural environment education in the future.

This research proves that the creation of children's gardens is rational from a business point of view due to the increase in the number of visitors. Children's gardens can be used by parents and educators as a place for well-rounded personality development of children through natural environment experiences.

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Appendices

Appendix 1. List of public gardens and the presence of children's gardens by region and state.

No.	Region	State	Name	CG[z]	GUC[y]	CGP[x]
1	North east	Connecticut	Bartlett Arboretum and Gardens	0	0	0
2			Connecticut College Arboretum	0	0	0
3			Dinosaur State Park and Arboretum	0	0	0
4			Highstead Arboretum	0	0	0
5			Marsh Botanic Gardens at Yale University	0	0	0
6			New Canaan Nature Center	0	0	0
7		Maine	Coastal Maine Botanical Gardens	1	0	0
8			Ecotat Gardens and Arboretum	0	0	0
9			Fay Hyland Botanical Plantation	0	0	0
10			Land & Garden Preserve	0	0	0
11			Longfellow Arboretum	0	0	0
12			Lyle Littlefield Ornamentals Trial Garden	0	0	0
13			McLaughlin Garden	0	0	0
14			Merryspring	0	0	0
15			Perkins Arboretum	0	0	0
16			University of Southern Maine Arboretum	0	0	0
17			Viles Arboretum	0	0	0
18		Massachusetts	Acton Arboretum	0	0	0
19			Arnold Arboretum of Harvard University	0	0	0
20			Berkshire Botanical Garden	1	0	0
21			Boston Public Garden	0	0	0
22			Heritage Museums and Gardens	0	0	0
23			Kelsey Arboretum	0	0	0
24			Long Hill Reservation	1	0	0
25			Massachusetts Horticultural Society	0	0	0
26			Mount Holyoke College Botanic Garden	0	0	0
27			New England Wildflower Society	0	0	0

28		Polly Hill Arboretum	0	0	0
29		The Botanic Garden of Smith College	0	0	0
30		The Case Estates	0	0	0
31		Tower Hill Botanic Gardens	0	0	1
32		Walter Hunnewell Arboretum	0	0	0
33		Wellesley College Botanic Gardens	0	0	0
34	New Hampshire	Bedrock Gardens	0	0	0
35		Distant Hill Gardens	0	0	0
36		Fuller Gardens	0	0	0
37		Rockingham County Botanical Gardens	0	0	0
38		The Fells Historic Estate and Gardens	0	0	0
39	New Jersey	Camden Children's Garden	1	0	0
40		Colonial Park Gardens	0	0	0
41		David C. Shaw Arboretum	0	0	0
42		Deep Cut Gardens	0	0	0
43		Frelinghuysen Arboretum	0	0	0
44		Greenwood Gardens	0	0	0
45		Herrontown Woods Arboretum	0	0	0
46		Hunterdon County Arboretum	0	0	0
47		Laurelwood Arboretum	0	0	0
48		Leamings Run Gardens	0	0	0
49		Leonard J. Buck Garden	0	0	0
50		Lewis W. Barton Arboretum and Nature Preserve	0	0	0
51		Morven Museum and Garden	0	0	0
52		Pohatcong Native Arboretum	0	0	0
53		Presby Memorial Iris Gardens	0	0	0
54		Reeves-Reed Arboretum	0	0	0
55		Robert A. Winters Arboretum	0	0	0
56		Rutgers Gardens	0	0	0
57		Sayen Park Botanical Garden	0	0	0
58		Sister Mary Grace Burns Arboretum	0	0	0
59		Skyland Association	0	0	0

60		Stony Brook Millstone Watershed Arboretum	0	0	0
61		The Cora Hartshorn Arboretum and Bird Sanctuary	0	0	0
62		Thielke Arboretum	0	0	0
63		Van Vleck House and Gardens	1	0	0
64		Wagner Farm Arboretum	0	0	0
65		Willowwood Arboretum	0	0	0
66	New York	Arboretum at Adelphi University	0	0	0
67		Bailey Arboretum	0	0	0
68		Bard College Arboretum	0	0	0
69		Bayard Cutting Arboretum	0	0	0
70		Boscobel Gardens	0	0	0
71		Bridge Gardens	0	0	0
72		Brooklyn Botanic Garden	1	0	0
73		Buffalo and Erie County Botanical Gardens	1	0	0
74		Clark Botanic Garden	1	0	0
75		Clermont Historic Garden	0	0	0
76		Cornell Plantations	0	0	0
77		Cutler Botanic Garden	0	0	0
78		Ellwanger Garden	0	0	0
79		F.R. Newman Arboretum	0	0	0
80		Garden Conservancy	0	0	0
81		Genesee Country Village and Museum	0	0	0
82		Hamilton College Arboretum	0	0	0
83		Highland Botanical Park	0	0	0
84		Historic Hudson Valley	0	0	0
85		Hofstra University Arboretum	0	0	0
86		Innisfree Garden	0	0	0
87		Ithaca Children's Garden	1	0	0
88		Landis Arboretum	0	0	0
89		Lasdon Park and Arboretum	0	0	0
90		LIU Post Community Arboretum	0	0	0
91		LongHouse Reserve	0	0	0

92		Madoo Conservancy Garden	0	0	0
93		Mary Flagler Cary Arboretum	0	0	0
94		Meyer Arboretum at Ward Pound Ridge Restoration	0	0	0
95		Montgomery Place Garden	0	0	0
96		Mountain Top Arboretum	0	0	0
97		Nannen Arboretum	0	0	0
98		New York Botanical Garden	1	0	0
99		Old Westbury Gardens	0	0	0
100		Orange County Arboretum	0	0	0
101		Pine Hollow Arboretum	0	0	0
102		Planting Fields Arboretum State Historic Park	0	0	0
103		Queens Botanical Garden	1	0	0
104		Snug Harbor Cultural Center and Botanical Garden	1	0	0
105		Sonnenberg Gardens and Mansion	0	1	0
106		Stonecrop Gardens	0	0	0
107		The Native Plant Center	0	0	0
108		University of Rochester Arboretum	0	0	0
109		Untermyer Gardens Conservancy	0	0	0
110		Vassar College Arboretum	0	0	0
111		Wave Hill	0	0	0
112		Weathersfield Garden	0	0	0
113		Webster Arboretum	0	0	0
114	Pennsylvania	Allegheny Arboretum at Indiana University of Pennsylvania	0	0	0
115		Ambler Arboretum of Temple University	0	0	0
116		American College Arboretum	0	0	0
117		Appleford/Parsons-Banks Arboretum	0	0	0
118		Arboretum at the Reading Public Museum	0	0	0
119		Arboretum of The Barnes Foundation	0	0	0
120		Arboretum Villanova	0	0	0
121		Awbury Arboretum and Historic Estate	0	0	0
122		Bartram's Garden	0	0	0

123	Bowman's Hill Wildflower Preserve	0	0	0
124	Bryn Mawr College	0	0	0
125	Centennial Arboretum	0	0	0
126	Chanticleer Foundation	0	0	0
127	Chatham University Arboretum	0	0	0
128	Crozer Arboretum	0	0	0
129	Erie Zoological Park and Botanical Garden	0	0	0
130	Goodell Gardens and Homestead	0	0	0
131	Graver Arboretum	0	0	0
132	Haverford College Arboretum	0	0	0
133	Henry Foundation for Botanical Research	0	0	0
134	Henry Schmieder Arboretum	0	0	0
135	Hershey Gardens	1	0	0
136	Jenkins Arboretum and Gardens	0	0	0
137	Kaskey Gardens	0	0	0
138	Kutztown University Arboretum	0	0	0
139	Lake Erie Arboretum	0	0	0
140	Longwood Gardens, Inc.	1	0	0
141	Louise Arnold Tanger Arboretum	0	0	0
142	Marywood University Arboretum	0	0	0
143	Morris Arboretum of the University of Pennsylvania	0	0	0
144	Penn State Mont Alto Arboretum	0	0	0
145	Phipps Conservatory and Botanical Gardens	1	0	0
146	Pittsburgh Botanic Garden	0	0	1
147	Reading Public Museum and Arboretum	0	0	0
148	Rodef Shalom Biblical Botanical Garden	0	0	0
149	Scott Arboretum of Swarthmore College	0	0	0
150	Shofuso Friends of the Japanese House and Garden	0	0	0
151	Taylor Memorial Arboretum	0	0	0
152	The Arboretum at California University of Pennsylvania	0	0	0
153	The Arboretum at Penn State	1	0	0

154			Tyler Arboretum	0	0	0
155			Welkinweir	1	0	0
156			William F. Curtis Arboretum	0	0	0
157			Wyck Historic House and Garden	0	0	0
158		Rhode Island	Blithewold Mansion, Gardens and Arboretum	0	0	0
159			Roger Williams park botanical center	0	0	0
160			University of Rhode Island Botanical Gardens	0	0	0
161			Wilcox Park	0	0	0
162		Vermont	Hildene Garden	0	0	0
163			Vermont Garden Park	0	0	0
164	Midwest	Illinois	Anderson Japanese Gardens	0	0	0
165			Botanic Garden The University of Chicago	0	0	0
166			Cantigny Park and Gardens	1	0	0
167			Chicago Botanic Gardens	1	0	0
168			Don Opel Arboretum	0	0	0
169			Elmhurst College Arboretum	0	0	0
170			Fell Arboretum	0	0	0
171			Garfield Park Conservatory Alliance	1	0	0
172			George L. Luthy Memorial Botanical Garden	0	0	0
173			Illinois Central College Arboretum	0	0	0
174			Illinois Wesleyan University Arboretum	0	0	0
175			Kaskaskia College Arboretum	0	0	0
176			Kishwaukee College	0	0	0
177			Klehm Arboretum and Botanic Garden	0	0	0
178			La Paloma Gardens - Rockford	0	0	0
179			Ladd Arboretum	0	0	0
180			Lincoln Memorial Gardens	0	0	0
181			Lincoln Park Conservatory	0	0	0
182			Longview Park Conservatory and Gardens	0	0	0
183			Luthy Botanical Garden	0	0	0
184			Mabery Gelvin Botanical Gardens	0	0	0
185			Nicholas Conservatory and Gardens	0	0	0

186		Oak Park Conservatory	0	0	0
187		Quad City Botanical Center	1	0	0
188		Starhill Forest Arboretum of Illinois College	0	0	0
189		The Gardens at SIUE	1	0	0
190		The Morton Arboretum	1	0	0
191		University of Illinois Arboretum	0	0	0
192		Washington Park Botanical Garden	0	0	0
193	Indiana	Charley Creek Gardens	0	0	0
194		Foellinger-Freimann Botanical Conservatory	0	0	0
195		Garfield Park Conservatory and Sunken Gardens	0	0	0
196		Hayes Arboretum	0	0	0
197		Indianapolis Museum of Art	0	0	0
198		White River Gardens	0	0	0
199		International Friendship Gardens	0	0	0
200		Minnetrista	0	0	0
201		Morris Conservatory and Muessel-Ellison Tropical Gardens	0	0	0
202		Purdue University Horticulture Gardens	0	0	0
203		Taltree Arboretum and Gardens	0	0	0
204		Warsaw Biblical Gardens	0	0	0
205		Wellfield Botanic Gardens	0	0	1
206	Iowa	Better Homes and Gardens Test Garden	0	0	0
207		Bickelhaupt Arboretum	0	0	0
208		Brenton Arboretum	0	0	0
209		Buxton Park Arboretum	0	0	0
210		Cedar Valley Arboretum and Botanic Gardens	1	0	0
211		Central Gardens of North Iowa	0	0	0
212		Des Moines Botanical and Environmental Center	0	0	1
213		Dubuque Arboretum and Botanical Gardens at Marshall Park	0	0	0
214		Iowa Arboretum	1	0	0

215		Muscatine Arboretum	0	0	0
216		Newton Arboretum and Botanical Gardens	0	0	0
217		Reiman Gardens, Iowa State University	1	0	0
218		University of Northern Iowa Botanical Center	0	0	0
219		Vander Veer Botanical Park	0	0	0
220	Kansas	Arboretum at Johnson County Community College	0	0	0
221		Bartlett Arboretum	0	0	0
222		Botanica, The Wichita Gardens	1	0	0
223		Dyck Arboretum of the Plains	0	0	1
224		Kansas Landscape Arboretum	0	0	0
225		Kansas State University Gardens	0	0	1
226		Overland Park Arboretum and Botanical Gardens	0	0	0
227		Parsons Arboretum	0	0	0
228	Michigan	Andrews University Campus Arboretum	0	0	0
229		Anna Scripps Whitcomb Conservatory	0	0	0
230		Arjay Miller Michigan Arboretum	0	0	0
231		Carbon Reclamation Arboretum	0	0	0
232		CMU Fabiano Botanical Garden	1	0	0
233		Dow Gardens	1	0	0
234		Fernwood Botanical Garden and Nature Preserve	0	0	0
235		For-Mar Nature Preserve and Arboretum	0	0	0
236		Frederik Meijer Gardens & Sculpture Park	1	0	0
237		Hidden Lake Gardens	0	0	1
238		Leila Arboretum Society	1	0	0
239		Matthaei Botanical Garden	0	0	0
240		Michigan State University Horticulture Gardens	1	0	0
241		Nichols Arboretum	0	0	0
242		Slayton Arboretum of Hillsdale College	0	0	0
243		Taylor Conservatory and Botanical Gardens	0	0	0
244		The Botanic Garden at Historic Barns Park	0	0	0

245		The Huron County Nature Center, Wilderness Arboretum	0	0	0
246		W. J. Beal Botanical Garden	0	0	0
247	Minnesota	Arneson Acres	0	0	0
248		Carleton College Cowling Arboretum	0	0	0
249		Como Park Zoo and Conservatory	0	0	0
250		Eloise Butler Wildflower Garden and Bird Sanctuary	0	0	0
251		Horticultural Display Gardens of the University of Minnesota	0	0	0
252		Horticultural Gardens at West Central Research and Outreach Center	0	0	0
253		Linnaeus Arboretum	0	0	0
254		Minnesota Landscape Arboretum	0	0	0
255		Munsinger Clemens Gardens	0	0	0
256		Muriel Sahlin Arboretum	0	0	0
257		Noerenberg Gardens	0	0	0
258		Normandale Japanese Garden	0	0	0
259		Northland Arboretum	0	0	0
260		Saint John's Arboretum	0	0	0
261		St. John’s Arboretum	0	0	0
262		University of Minnesota Biological Sciences Greenhouse	0	0	0
263		Veterans Memorial Rose Garden	0	0	0
264		West Central Research and Outreach Center Horticultural Gardens	0	0	0
265	Missouri	Close Memorial Park Botanical Gardens and Arboretum	0	0	0
266		McAlester Arboretum	0	0	0
267		McLane Arboretum	0	0	0
268		Missouri Botanical Garden	0	0	0
269		Missouri State Arboretum	0	0	0
270		Mizzou Botanic Garden	0	0	0
271		Powell Gardens	0	0	0

272		Prairie Garden Trust	0	0	0
273		Shaw Nature Reserve	0	0	0
274	Nebraska	Alice Abel Arboretum	0	0	0
275		Arbor Lodge State Historical Park Arboretum	0	0	0
276		Bellevue University Arboretum	0	0	0
277		D. A. Murphy Panhandle Arboretum	0	0	0
278		Doane College Osterhout Arboretum	0	0	0
279		Earl G. Maxwell Arboretum	0	0	0
280		Franklin-Cotterrell Greens Arboretum	0	0	0
281		Gilman Park Arboretum	0	0	0
282		Lauritzen Gardens	0	0	0
283	North Dakota	International Peace Garden	0	0	0
284		Myra Arboretum	0	0	0
285		Northern Plains Botanic Garden	0	0	0
286	Ohio	Bull's Run Nature Sanctuary and Arboretum	0	0	0
287		Chadwick Arboretum & Learning Gardens	0	0	0
288		Cincinnati Zoo and Botanical Garden	0	0	0
289		Cleveland Botanical Garden	1	0	0
290		Draime Estate Gardens	0	0	0
291		Fellows Riverside Gardens	0	0	0
292		Franklin Park Conservatory	0	0	0
293		Gardenview Horticultural Park	0	0	0
294		Inniswood Metro Gardens	1	0	0
295		James H. McBride Arboretum	0	0	0
296		James M. Cox, Jr. Arboretum Foundation	0	0	0
297		Kingwood Center	0	0	0
298		Krohn Conservatory	0	0	0
299		Mt. Airy Forest and Arboretum	0	0	0
300		R.A. Stranahan Arboretum	0	0	0
301		Ramser Arboretum	0	0	0
302		Rowe Arboretum	0	0	0
303		Schedel Arboretum and Gardens	0	0	0

304			Schoepfle Garden	0	0	0
305			Secrest Arboretum	0	0	0
306			Stan Hywet Hall	0	0	0
307			The Dawes Arboretum	0	0	0
308			The Holden Arboretum	0	0	1
309			Toledo Botanical Garden	0	1	0
310			Wegerzyn Gardens MetroPark	1	0	0
311			Great Plains Native Plant Society Garden	0	0	0
312			Kuhnert Arboretum	0	0	0
313		South Dakota	McCrory Gardens	0	0	1
314			Ralph Cole Arboretum	0	0	0
315			The Mary Jo Wegner Arboretum	0	0	0
316			Allen Centennial Gardens	0	0	0
317			Al's Auto Body and Arboretum	0	0	0
318			Arbor View Gardens	0	0	0
319			Boerner Botanical Gardens	0	0	0
320			Bookworm Gardens	0	0	0
321			Cofrin Memorial Arboretum	0	0	0
322			Foxfire Botanical Gardens	0	0	0
323			Gardens of the Fox Cities	1	0	0
324			Gottfried Prairie and Arboretum	0	0	0
325		Wisconsin	Green Bay Botanical Garden	1	0	0
326			Gundersen Arboretum Norskedalen Nature & Heritage Center	0	0	0
327			Hawthorn Hollow Nature Sanctuary and Arboretum	0	0	0
328			Mitchell Park Horticultural Conservatory	0	0	0
329			Olbrich Botanical Gardens	1	0	0
330			Paine Art Center and Gardens	0	0	0
331			Rotary Botanical Gardens	1	0	0
332			University of Wisconsin-Madison Arboretum	0	0	0
333			Aldridge Botanical Gardens	0	0	1
334	South	Alabama	Bellingrath Gardens and Home	0	0	0
335			Birmingham Botanical Gardens	0	0	0

336		Donald E. Davis Arboretum	0	0	0
337		Dothan Area Botanical Gardens	0	0	0
338		Huntsville Botanical Garden	0	0	0
339		Jasmine Hill Gardens	0	0	0
340		Mobile Botanical Gardens	0	0	1
341		Noccalula Falls Botanic Gardens	0	0	0
342		Troy University Arboretum	0	0	0
343		University of Alabama Arboretum	1	0	0
344		William Bartram Arboretum	0	0	0
345	Arkansas	Botanical Garden of the Ozarks	1	0	0
346		Compton Gardens	0	0	0
347		Garvan Woodland Gardens	0	0	0
348		South Arkansas Arboretum	0	0	0
349	Delaware	Mt. Cuba Center	0	0	0
350		University of Delaware Botanic Gardens	0	0	0
351		Winterthur Museum, Garden and Library	1	0	0
352	District of Columbia	American University Arboretum and Public Gardens	0	0	0
353		Dumbarton Oaks	0	0	0
354		Hillwood Museum and Gardens	0	0	0
355		Kenilworth Aquatic Gardens	0	0	0
356		Smithsonian Gardens	0	0	0
357		Smithsonian's National Zoological Park	0	0	0
358		Tudor Place Historic Garden	1	0	0
359		United States Botanic Garden	0	0	0
360		United States National Arboretum	0	0	0
361	Florida	Alfred B. Maclay State Gardens	0	0	0
362		Arboretum of the University of Central Florida	0	0	0
363		Block Botanical Garden	0	0	0
364		Bok Tower Gardens	0	0	1
365		Cummer Museum of Art & Gardens	0	0	0
366		Cypress Gardens	0	0	0
367		Deerfield Beach Arboretum	0	0	0

368	Edison and Ford Winter Estates	0	0	0
369	Fairchild Tropical Botanic Garden	0	0	0
370	Flamingo Gardens	0	0	0
371	Florida botanical gardens	0	0	0
372	Florida Institute of Technology Botanical Gardens	0	0	0
373	Gardens of the Big Bend at University of Florida	0	0	0
374	Harry P. Leu Gardens	0	0	0
375	Heathcote Botanical Gardens	0	0	0
376	Jacksonville Arboretum and Gardens	0	0	0
377	Jacksonville Zoo and Gardens	0	0	0
378	John C. Gifford Arboretum, University of Miami	0	0	0
379	Kanapaha Botanical Gardens	1	0	0
380	Key West Tropical Forest and Botanical Garden	0	0	0
381	Marie Selby Botanical Gardens	1	0	0
382	McKee Botanical Garden	0	0	0
383	Mead Botanical Garden	0	0	0
384	Miami Beach Botanical Garden	0	0	0
385	Miami Dade Zoological Park and Gardens	0	0	0
386	Montgomery Botanical Center	0	0	0
387	Morikami Museum and Japanese Gardens	0	0	0
388	Mounts Botanical Garden	0	0	0
389	Naples Botanical Garden	1	0	0
390	Naples Zoo at Caribbean Gardens	0	0	0
391	Nature Coast Botanical gardens & Nursery	0	0	0
392	Palma Sola Botanical Park	0	0	0
393	Port St. Lucie Botanical Gardens	0	0	1
394	Redland Tropical Gardens Botanical Foundation, Inc.	0	0	0
395	Sarasota Jungle Gardens	0	0	0

396		Sugar Mill Botanic Gardens of Volusia	0	0	0
397		Sunken Gardens	0	0	0
398		The Florida Botanical Gardens	0	0	0
399		The Four Arts Botanical Gardens	0	0	0
400		The Kampong	0	0	0
401		Unbelievable Acres Botanic Gardens, Inc.	0	0	0
402		University of Central Florida Arboretum	0	0	0
403		University of South Florida Botanical Gardens	0	0	0
404	Georgia	Armstrong Atlantic State University Arboretum	0	0	0
405		Atlanta Botanical Garden	1	0	0
406		Callaway Gardens	0	0	0
407		Chatham County Botanical Garden	0	0	0
408		Coastal Georgia Botanical gardens	0	0	1
409		Coastal Plain Research Arboretum	0	0	0
410		Columbus Botanical Garden	0	0	1
411		Fred Hamilton Rhododendron Garden	0	0	0
412		Georgia Perimeter College Botanical Garden	0	0	0
413		Georgia Southern Botanical Garden	1	0	0
414		Goizueta Gardens	0	0	0
415		Hart County Botanical Garden	0	0	0
416		Hills and Dales Estate	0	0	0
417		Latin American Ethnobotanical Garden	0	0	0
418		Lockerly Arboretum	0	0	0
419		Massee Lane Gardens American Camellia Society	1	0	0
420		Smith-Gilbert Gardens	0	0	1
421		State Botanical Garden of Georgia	0	0	1
422		Thompson Mill Forest Arboretum	0	0	0
423		University of Georgia Campus Arboretum	0	0	0
424		University of West Georgia Arboretum	0	0	0
425		Vines Botanical Gardens	0	0	0
426		Waddell Barnes Botanical Gardens	0	0	0

427		Wesleyan College Arboretum	0	0	0
428		Woodlands Garden	0	0	0
429	Kentucky	Ashland, The Henry Clay Estate	0	0	0
430		Baker Arboretum	0	0	0
431		Bernheim Arboretum and Research Forest	0	0	0
432		Big Bone Garden	0	0	0
433		Boone County Arboretum	0	0	0
434		Lakeside Commons Educational Gardens	0	0	0
435		Nannine Clay Wallis Arboretum	0	0	0
436		University of Kentucky Arboretum	1	0	0
437		Western Kentucky Botanical Garden	0	0	0
438		Yew Dell Gardens	0	0	0
439	Louisiana	Biedenharn Museum and Gardens	0	0	0
440		Independence Park Botanic Gardens	0	0	0
441		Jungle Gardens	0	0	0
442		Laurens Henry Cohn, Sr. Memorial Plant Arboretum	0	0	0
443		Longue Vue House and Gardens	0	0	0
444		Louisiana State Arboretum	0	0	0
445		Louisiana State University Ag Center	0	0	0
446		Louisiana Tech University Arboretum	0	0	1
447		LSU Hilltop Arboretum	0	0	0
448		New Orleans Botanical Garden	0	0	0
449		The Gardens of the American Rose Center	0	0	0
450	Maryland	Adkins Arboretum	1	0	0
451		Annmarie Garden	0	0	0
452		Brookside Gardens	1	0	0
453		Cylburn Arboretum	0	0	0
454		Howard Peters Rawlings Conservatory and Botanic Gardens	0	0	0
455		Ladew Topiary Gardens	0	0	0
456		McCrillis Gardens	0	0	0
457		Mt. Washington Arboretum	0	0	0
458		Salisbury University Arboretum	0	0	0

459		University of Maryland Arboretum and Botanical Garden	0	0	0
460	Mississippi	Jackson State University Botanical Garden	0	0	0
461		Montrose and the Montrose Arboretum	0	0	0
462		Mynelle Gardens Arboretum & Botanical Center	0	0	0
463		Simmons Arboretum	0	0	0
464		The Crosby Arboretum	0	0	0
465		Wister Gardens	0	0	0
466	North Carolina	Airlie Gardens	0	0	0
467		Arboretum of Haywood Community College	0	0	0
468		Cape Fear Botanical Garden	1	0	0
469		Charles R. Keith Arboretum	0	0	0
470		Cherokee Botanical Garden	0	0	0
471		Daniel Boone Native Gardens	0	0	0
472		Daniel Stowe Botanical Garden	0	1	0
473		Davidson College Arboretum	0	0	0
474		De Hart Botanical Gardens	0	0	0
475		Gateway Gardens	0	0	0
476		Greensboro Arboretum	0	0	0
477		Highlands Biological Station	0	0	0
478		J.C. Raulston Arboretum	0	0	0
479		Juniper Level Botanic Gardens	0	0	0
480		Mariana H. Qubein Arboretum and Botanical Gardens	0	0	0
481		New Hanover County Arboretum	0	0	0
482		North Carolina Botanical Garden	1	0	0
483		Paul J. Ciener Botanical Garden	0	0	1
484		Pitt County Arboretum	0	0	0
485		Reynolda Gardens of Wake Forest University	0	0	0
486		Sandhills Horticultural Gardens	1	0	0
487		Sarah P. Duke Gardens	1	0	0
488		Tanglewood Park Arboretum and Rose Garden	0	0	0

489		The Arboretum at Johnston Community College	0	0	1
490		The Bog Garden	0	0	0
491		The Botanical Gardens at Asheville	0	0	0
492		The Elizabethan Gardens	0	0	1
493		The North Carolina Arboretum	0	0	0
494		University of North Carolina at Charlotte Botanical Gardens	0	0	0
495		University of North Carolina at Wilmington Arboretum	0	0	0
496		Wilson Botanical garden	0	0	0
497		Wing Haven Gardens and Bird Sanctuary	1	0	0
498	Oklahoma	Cann Memorial Botanical Gardens	0	0	0
499		Central Gardens of the University of Central Oklahoma	1	0	0
500		Garrard Ardeneum	0	0	0
501		Lendonwood Gardens	0	0	0
502		Morrison Arboretum	0	0	0
503		Myriad Botanical Gardens	1	0	0
504		North Central Oklahoma Cactus Botanical Garden	0	0	0
505		North Oklahoma Botanical Garden and Arboretum	0	0	0
506		The Botanic Garden Oklahoma State University	1	0	0
507		Tulsa Botanic Garden	0	0	1
508		Tulsa Garden Center	0	0	0
509		Will Rogers Gardens	0	0	0
510	South Carolina	Brookgreen Gardens	0	0	0
511		Cypress Gardens	0	0	0
512		Furman University Japanese Garden	0	0	0
513		Kalmia Gardens	0	0	0
514		Magnolia Plantation and Gardens	0	0	0
515		Moore Farms Botanical Garden	0	0	0
516		Riverbanks Zoo and Botanical Garden	0	0	0
517		South Carolina Botanical Garden	1	0	0

518		W. Gordon Belser Arboretum	0	0	0
519		Wells Japanese Garden	0	0	0
520	Tennessee	Cheekwood Botanical Garden	0	0	0
521		Cherokee Arboretum at Audubon Acres	0	0	0
522		Cherokee Trail Arboretum	0	0	0
523		Oaklawn Garden	0	0	0
524		Daniel Boone Arboretum	0	0	0
525		Dixon Gallery and Gardens	0	0	0
526		East Tennessee State University Arboretum	0	0	0
527		Gerald D. Coorts Memorial Arboretum	0	0	0
528		Hermitage Arboretum	0	0	0
529		Knoxville Botanical Garden and Arboretum	0	0	0
530		Louise Pearson Memorial Arboretum	0	0	0
531		McMinnville Sunset Hills Arboretum	0	0	0
532		Memphis Botanic Garden	1	0	0
533		Pleasant Run Creek Arboretum	0	0	0
534		Reflection Riding Arboretum and Botanical Garden	0	0	0
535		Rhodes College Arboretum	0	0	0
536		Stones River Greenway Arboretum	0	0	0
537		University of Tennessee Arboretum	0	0	0
538		University of Tennessee Gardens	0	0	0
539		Vanderbilt University Arboretum	0	0	0
540	Texas	Amarillo Botanical Gardens	0	0	1
541		Bayou Bend Gardens	0	0	0
542		Beaumont Botanical Gardens	0	0	0
543		Botanic Garden of Houston	0	0	0
544		Carleen Bright Arboretum	0	0	0
545		Chihuahuan Desert Nature Center	0	0	0
546		Clark Gardens	0	0	0
547		D. A. "Andy" Anderson Arboretum	0	0	0
548		Dallas Arboretum and Botanical Gardens	1	0	0
549		East Texas Arboretum	0	0	0

550		El Paso Desert Botanical Garden	0	0	0
551		Fort Worth Botanic Garden	0	0	0
552		Grapevine Botanical Gardens	0	0	0
553		Houston Arboretum and Nature Center	0	0	0
554		Houston Botanic Garden	0	0	1
555		Lady Bird Johnson Wildflower Center	1	0	0
556		Lubbock Memorial Arboretum	0	0	1
557		Lynn R. Lowrey Arboretum	0	0	0
558		Mast Arboretum	0	0	0
559		McAllen Botanical Gardens	0	0	0
560		Mercer Arboretum and Botanic Gardens	0	0	0
561		Peckerwood Garden	0	0	0
562		Riverside Nature Center	0	0	0
563		San Antonio Botanical Garden	0	0	0
564		Shangri La Botanical Gardens and Nature Center	0	0	0
565		South Texas Botanical Gardens & Nature Center	0	0	0
566		Texas Discovery Gardens	0	0	0
567		Zilker Botanical Garden	0	0	0
568	Virginia	Boxerwood Nature Center and Woodland Garden	0	0	0
569		Chesapeake Arboretum	0	0	0
570		Edith J. Carrier Arboretum and Botanical Gardens	0	0	1
571		Green Spring Gardens	1	0	0
572		Hahn Horticulture Garden of Virginia Tech	0	0	0
573		Hermitage Museum and Gardens	0	0	0
574		Lewis Ginter Botanical Garden	1	0	0
575		MacCallum More Museum and Gardens	0	0	0
576		Maymont Foundation	0	0	0
577		McIntire Botanical Garden	0	0	1
578		Meadowlark Botanical Gardens	1	0	0
579		Norfolk Botanical Garden	1	0	0
580		Orland E. White Arboretum	0	0	0

581			American Horticultural Society	1	0	0
582			The Community Arboretum at VWCC	0	0	0
583			Thomas Jefferson's Monticello	0	0	0
584			Ticonderoga Botanical Gardens and Arboretum	0	0	0
585			Tidewater Arboretum	0	0	0
586			Virginia House Gardens	1	0	0
587			Williamsburg Botanical Garden	1	0	0
588			Earl L. Core Arboretum	0	0	0
589		West Virginia	Huntington Museum of Art	0	0	0
590			West Virginia Botanic Garden	0	0	1
591			Alaska Botanical Garden	0	0	1
592			Georgeson Botanical Garden	1	0	0
593		Alaska	Glacier Gardens Rainforest Reserve	0	0	0
594			Jensen-Olson Arboretum	0	0	0
595			Arboretum at Arizona State University	0	0	0
596			Arboretum at Flagstaff	0	0	0
597			Arizona Cactus Botanical Garden	0	0	0
598			Arizona-Sonora Desert Museum	0	0	0
599			Boyce Thompson Arboretum	0	0	0
600			Desert Botanical Garden	0	0	1
601			Forever Ranch and Gardens	0	0	0
602	West	Arizona	Navajo Nation Zoological and Botanical Park	0	0	0
603			Northern Arizona University Arboretum	0	0	0
604			Phoenix Zoo	0	1	0
605			Tohono Chul Park	1	0	0
606			Tucson Botanical Gardens	0	0	0
607			University of Arizona Campus Arboretum	0	0	0
608			Alta Vista Gardens	1	0	0
609			Arboretum at California State University	0	0	0
610		California	Arboretum at the University of California	0	0	0
611			Balboa Park Gardens	0	0	0
612			Blake Garden	0	0	0

613	California Garden	0	0	1
614	California State Northridge Botanic Garden	0	0	0
615	Charles C. Jensen Botanical Gardens	0	0	0
616	Chavez Ravine Arboretum	0	0	0
617	Clovis Botanical Garden	0	0	1
618	Conejo Valley Botanic Garden	0	0	0
619	Descanso Gardens	0	0	0
620	Dunsmuir Botanical Gardens	0	0	0
621	Earl Burns Miller Japanese Garden	0	0	0
622	Elizabeth F. Gamble Garden	0	0	0
623	Filoli Center	0	0	0
624	Flora Tropica Gardens	0	0	0
625	Forrest Deaner Native Plant Botanic Garden	0	0	0
626	Fullerton Arboretum	0	0	0
627	Ganna Walska Lotusland	0	0	0
628	Garden at Heather Farm	0	0	0
629	Green Gulch Garden	0	0	0
630	Guadalupe River Park Conservancy	0	0	0
631	Hakone Gardens	0	0	0
632	Hortense Miller Garden	0	0	0
633	Hughson Arboretum and Gardens, Inc.	0	0	0
634	Humboldt Botanical Gardens	0	0	0
635	Leaning Pine Arboretum	0	0	0
636	Life Lab	0	0	0
637	Los Angeles County Arboretum and Botanic Garden	0	0	0
638	Luther Burbank Home and Gardens	0	0	0
639	Manhattan Beach Botanical Garden	0	0	0
640	Marin-Bolinas Botanical Gardens	0	0	0
641	Markham Regional Arboretum	0	0	0
642	McConnell Arboretum & Gardens	0	0	0
643	Mendocino Coast Botanical Gardens	0	0	0
644	Mildred E. Mathias Botanical Garden	0	0	0

645		Moorten Botanical Gardens	0	0	0
646		Niguel Botanical Preserve	0	0	0
647		Palomar College Arboretum	0	0	1
648		Pikake Botanical Garden	0	0	0
649		Quarryhill Botanical Garden	0	0	0
650		Rancho Santa Ana Botanic Garden	0	0	0
651		Regional Parks Botanic Garden	0	0	0
652		San Diego Botanic Garden	1	0	0
653		San Diego Zoo	0	0	0
654		San Francisco Botanical Garden	1	0	0
655		San Francisco Conservatory of Flowers	0	0	0
656		San Luis Obispo Botanical Garden	0	0	0
657		San Mateo Arboretum	0	0	0
658		Santa Barbara Botanic Garden	0	0	0
659		Santa Barbara Mission	0	0	0
660		Sherman Library & Gardens	0	0	0
661		South Bay Botanic Gardens	0	0	0
662		South Coast Botanic Garden	0	0	0
663		Stanford University Arboretum	0	0	0
664		The Huntington Library, Art Collections and Botanical Gardens	1	0	0
665		The Living Desert	0	0	0
666		The Ruth Bancroft Garden	0	0	0
667		UC Davis Arboretum	1	0	0
668		University of California Botanical Garden at Berkeley	0	0	0
669		University of California Irvine Arboretum	0	0	0
670		University of California Riverside Botanic Gardens	0	0	0
671		Virginia Robinson Gardens	0	0	0
672		Water Conservation Garden	0	1	0
673		Wrigley Memorial and Botanical Garden	0	0	0
674		The Gardens on Spring Creek	1	0	0
675	Colorado	Betty Ford Alpine Gardens	1	0	0
676		Denver Botanic Gardens	1	0	0

677		Chester M. Alter Arboretum	0	0	0
678		Arboretum/Woody Plant Research	0	0	0
679		Parker Arboretum	0	0	0
680		Shambhala Botanic Gardens	0	0	0
681		Western Colorado Botanical Gardens	0	0	0
682		Andrews Arboretum	0	0	0
683		Hudson Gardens and Event Center	0	0	0
684		Mesa County Arboretum at The Gardens	0	0	0
685		Montrose Botanic Gardens	0	0	0
686		Yampa River Botanic Park	0	0	0
687	Hawaii	Amy B. H. Greenwell Ethnobotanical Garden	0	0	0
688		D.T. Fleming Arboretum	0	0	0
689		Enchanting Floral Gardens of Kula, Maui	0	0	0
690		Foster Botanical Garden	0	0	0
691		Garden of Eden Botanical Arboretum	0	0	0
692		Harold L. Lyon Arboretum	1	0	0
693		Hawaii Tropical Botanical Garden	0	0	0
694		Ho'omaluhia Botanical Garden	0	0	0
695		Kahanu Gardens	0	0	0
696		Kaia Ranch Tropical Botanical Gardens	0	0	0
697		Ke'anae Arboretum	0	0	0
698		Koko Crater Botanical Garden	0	0	0
699		Kula Botanical Garden	0	0	0
700		Lili'uokalani Botanic Garden	0	0	0
701		Limahuli garden	0	0	0
702		Maui Nui Botanical Gardens	0	0	1
703		McBryde Gardens and Preserve	0	0	1
704		Moir Gardens	0	0	0
705		Na 'Aina Kai Botanical Gardens	1	0	0
706		Nani Mau Gardens	0	0	0
707		Pua Mau Place Arboretum and Botanical Garden	0	0	0
708		Sadie Seymour Botanical Gardens	0	0	0

709		Tropical Gardens of Maui	0	0	0
710		University of Hawaii at Hilo Botanical Gardens	0	0	0
711		Wahiawa Botanical Garden	0	0	0
712		Waimea Valley Arboretum and Botanical Garden	1	0	0
713		World Botanical Gardens	1	0	0
714	Idaho	Idaho Botanical Garden	1	0	0
715		Idaho State Arboretum	0	0	0
716		Sawtooth Botanical Garden	0	0	0
717		University of Idaho Arboretum and Botanical Garden	0	0	0
718	Montana	International Larix Arboretum	0	0	0
719		Montana Arboretum and Gardens	0	0	0
720		Tizer Botanic Gardens and Arboretum	0	0	0
721	Nevada	Ethel M Botanical Cactus Garden	0	0	0
722		Gardens at the Springs Preserve	0	0	0
723		University of Nevada Las Vegas Arboretum	0	0	0
724		University of Nevada Reno Arboretum	0	0	0
725		Washoe Wilbur D. May Arboretum and Botanical Garden	0	0	0
726	New Mexico	New Mexico State University Botanical Garden	0	0	0
727		Rio Grande Botanic Gardens at ABQ BioPark	1	0	0
728		Santa Fe Botanical Garden	0	0	1
729		University of New Mexico Arboretum	0	0	0
730	Oregon	Beekman Native Plant Arboretum	0	0	0
731		Berry Botanic Garden	0	0	0
732		Claire Hanley Arboretum	0	0	0
733		Delbert Hunter Arboretum	0	0	0
734		Hoyt Arboretum	0	0	0
735		Japanese Garden Society of Oregon	0	0	0
736		Lan Su Chinese Garden	0	0	0
737		Leach Botanical Garden	1	0	0
738		Martha Springer Botanical Garden	0	0	0

739		Mount Pisgah Arboretum	0	0	0
740		Oregon Trail Arboretum	0	0	0
741		Peavy Arboretum	0	0	0
742		Portland Japanese Garden	0	0	0
743		Rogue Community College Arboretum	0	0	0
744		The Oregon Garden	0	0	0
745	Utah	Conservation Garden Park	0	0	0
746		Ogden Botanical Gardens	1	0	0
747		Petersen Arboretum	0	0	0
748		Red Butte Garden and Arboretum	1	0	0
749		Santa Clara City Arboretum	0	0	0
750		Thanksgiving Point	0	0	0
751		Utah Botanical Center	0	0	0
752	Washington	Bellevue Botanical Garden	0	0	0
753		Bloedel Reserve	0	0	0
754		Bradner Gardens Park	0	0	0
755		Center for Urban Horticulture	0	0	1
756		Elisabeth C. Miller Botanical Garden	0	0	0
757		Evergreen Arboretum and Gardens	0	0	0
758		Heronswood	0	0	0
759		Highline SeaTac Botanical Garden	0	0	1
760		Hulda Klager Lilac Gardens	0	0	0
761		John A. Finch Arboretum	0	0	0
762		Kruckeberg Botanic Garden	0	0	0
763		Kubota Garden	0	0	0
764		Lake Wilderness Arboretum	0	0	0
765		Lakewold Gardens	0	0	0
766		Manito Park and Botanical Gardens	0	0	0
767		Rhododendron Species Botanical Garden	0	0	0
768		Sehome Hill Arboretum	0	0	0
769		South Seattle College Arboretum	0	0	0
770		Streissguth Gardens	0	0	0
771		Volunteer Park Conservatory	0	0	0

		W. W. Seymour Botanical Conservatory	0	0	0
		Washington Park Arboretum	0	0	0
		Wright Park Arboretum	0	0	0
		Yakima Area Arboretum	0	0	0
	Wyoming	Cheyenne Botanic Gardens	0	0	0

[z]CG: Children's garden. [y]CGUC: Children's garden under construction. [x]CGP: Children's garden planned.

Appendix 2. Research questionnaire and cover letter

KOREA UNIVERSITY
Graduate School

July 26, 2011

Dear Children's Garden Director and Education Department,

I am writing to seek your participation in a national study I am conducting for my doctoral dissertation on *Children's Gardens & Education Programs in the United States*. The purpose of this study is to document the extent to which public gardens and arboreta across the United States are providing educational and interactive garden activities for children, as well as to offer insights about the benefits of having this type of garden.

I am currently a doctoral candidate in horticulture science at Korea University and work at Korea National Arboretum in the education department as an associate researcher. I've been studying children's gardens and education programs since when I was at Longwood Gardens as an international intern in 2004 to 2005. I had another internship at Kew Gardens which fueled my passion for studying children's gardens and education programs.

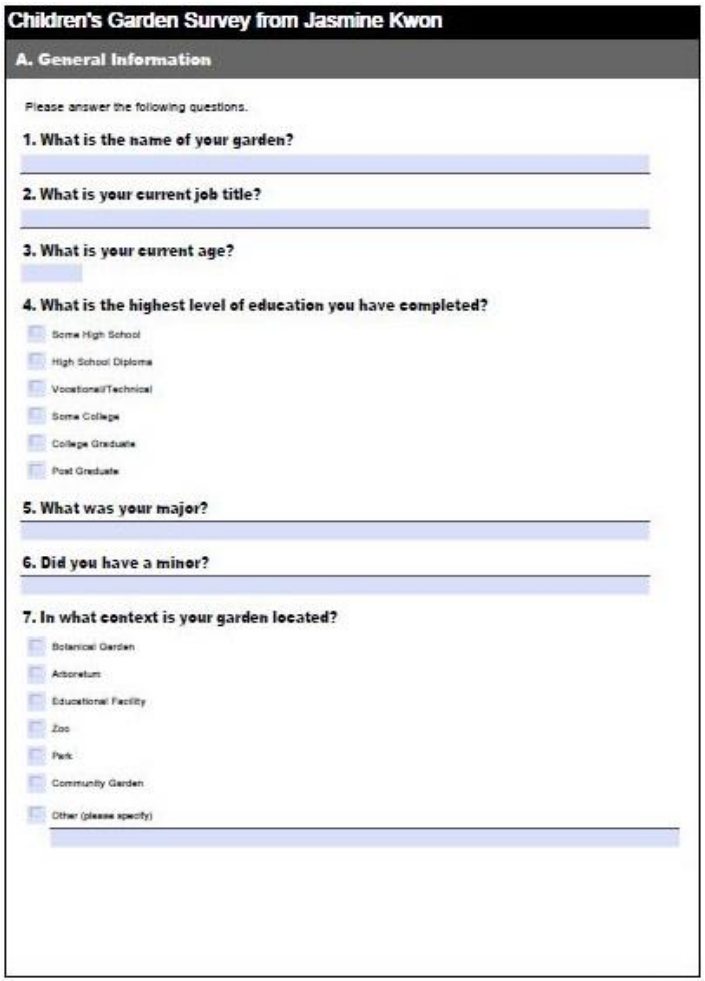
The following questionnaire will take approximately 10 minutes to complete and should be completed by a staff member who is involved in, or familiar with, the children's garden at your public garden or arboretum. Your participation in this survey is entirely voluntary, however the success of my research will depend on your contributions.

Findings from this study will be published in a reference that will help inform horticultural professionals about the many different children's gardens open to the public within the United States. Should you have any further questions or comments, please feel free to contact me via email: jasminemin@hotmail.com or phone: +82-10-9230-4628. Thank you in advance for any information you can provide!

Sincerely,

Min Hyeong Kwon
Doctoral Candidate
College of Life Sciences & Biotechnology, Graduate School
Korea University, Anam-dong, Sengbuk-gu, Seoul, 136-701, Korea
http://graduate2.korea.ac.kr/main/main.jsp

Appendix 3. Research questionnaire survey form.



Children's Garden Survey from Jasmine Kwon

A. General Information

Please answer the following questions.

1. What is the name of your garden?

2. What is your current job title?

3. What is your current age?

4. What is the highest level of education you have completed?

- Some High School
- High School Diploma
- Vocational/Technical
- Some College
- College Graduate
- Post Graduate

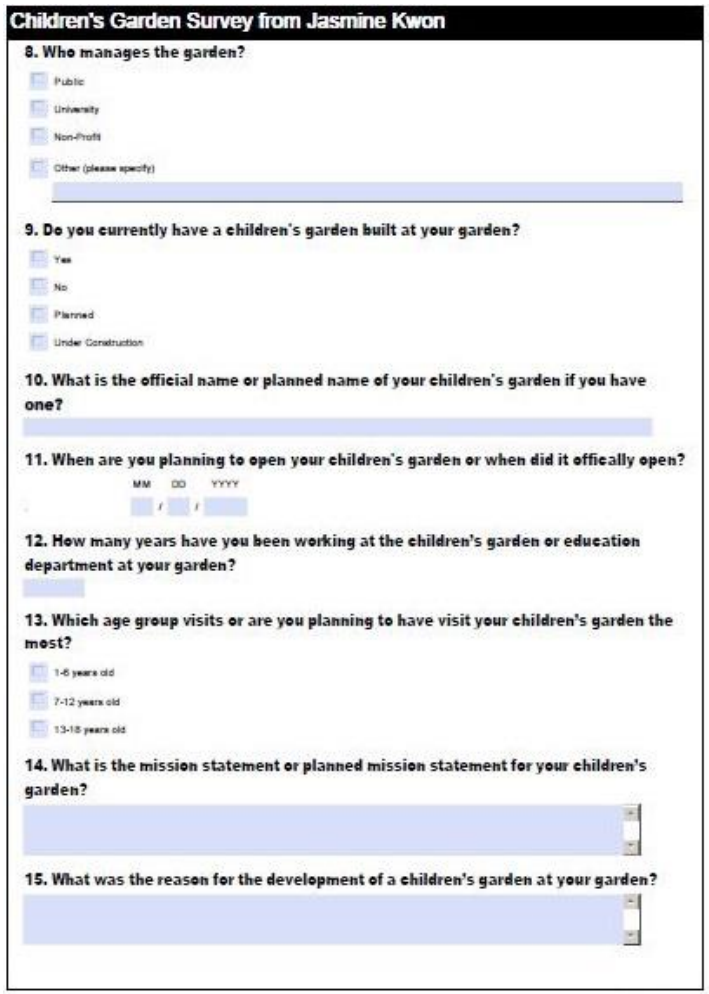
5. What was your major?

6. Did you have a minor?

7. In what context is your garden located?

- Botanical Garden
- Arboretum
- Educational Facility
- Zoo
- Park
- Community Garden
- Other (please specify)

Page 1



Children's Garden Survey from Jasmine Kwon

8. Who manages the garden?

- Public
- University
- Non-Profit
- Other (please specify)

9. Do you currently have a children's garden built at your garden?

- Yes
- No
- Planned
- Under Construction

10. What is the official name or planned name of your children's garden if you have one?

11. When are you planning to open your children's garden or when did it offically open?

MM / DD / YYYY

12. How many years have you been working at the children's garden or education department at your garden?

13. Which age group visits or are you planning to have visit your children's garden the most?

- 1-6 years old
- 7-12 years old
- 13-18 years old

14. What is the mission statement or planned mission statement for your children's garden?

15. What was the reason for the development of a children's garden at your garden?

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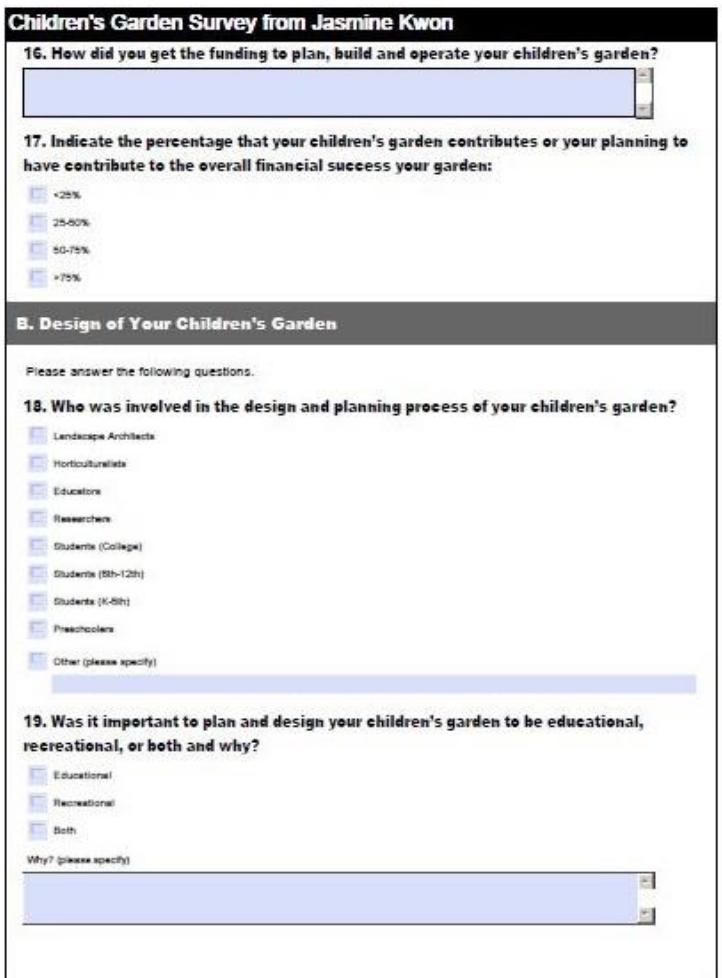
Appendix 3. Research questionnaire survey form.



Children's Garden Survey from Jasmine Kwon

16. How did you get the funding to plan, build and operate your children's garden?

17. Indicate the percentage that your children's garden contributes or your planning to have contribute to the overall financial success your garden:

- <25%
- 25-50%
- 50-75%
- >75%

B. Design of Your Children's Garden

Please answer the following questions.

18. Who was involved in the design and planning process of your children's garden?

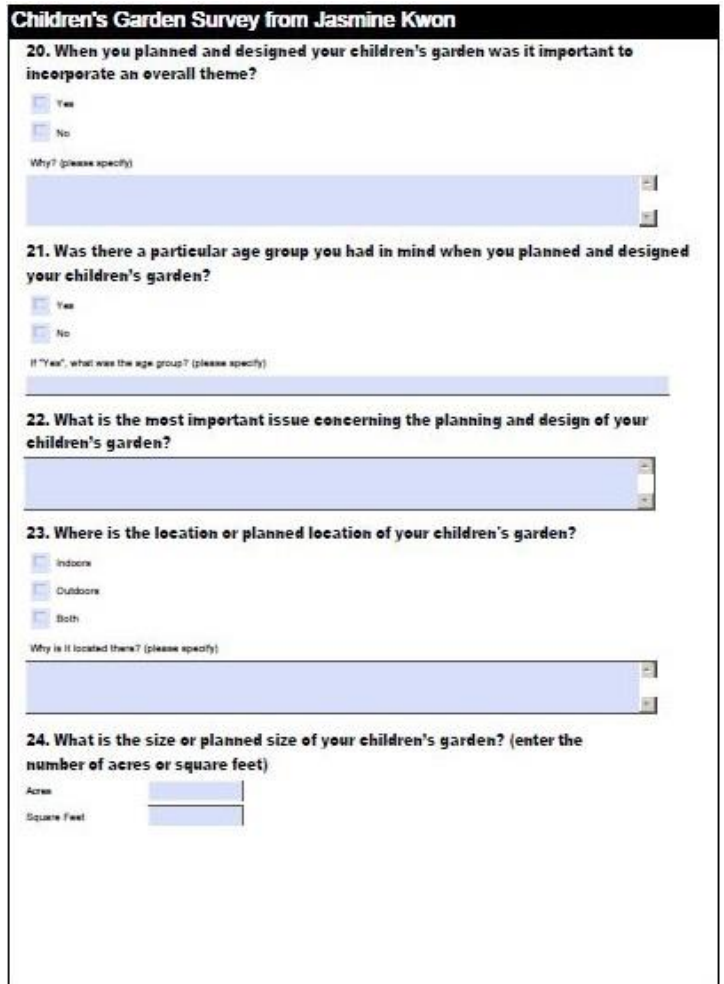
- Landscape Architects
- Horticulturalists
- Educators
- Researchers
- Students (College)
- Students (8th-12th)
- Students (K-5th)
- Preschoolers
- Other (please specify)

19. Was it important to plan and design your children's garden to be educational, recreational, or both and why?

- Educational
- Recreational
- Both

Why? (please specify)

Page 3



Children's Garden Survey from Jasmine Kwon

20. When you planned and designed your children's garden was it important to incorporate an overall theme?

- Yes
- No

Why? (please specify)

21. Was there a particular age group you had in mind when you planned and designed your children's garden?

- Yes
- No

If "Yes", what was the age group? (please specify)

22. What is the most important issue concerning the planning and design of your children's garden?

23. Where is the location or planned location of your children's garden?

- Indoors
- Outdoors
- Both

Why is it located there? (please specify)

24. What is the size or planned size of your children's garden? (enter the number of acres or square feet)

- Acres
- Square Feet

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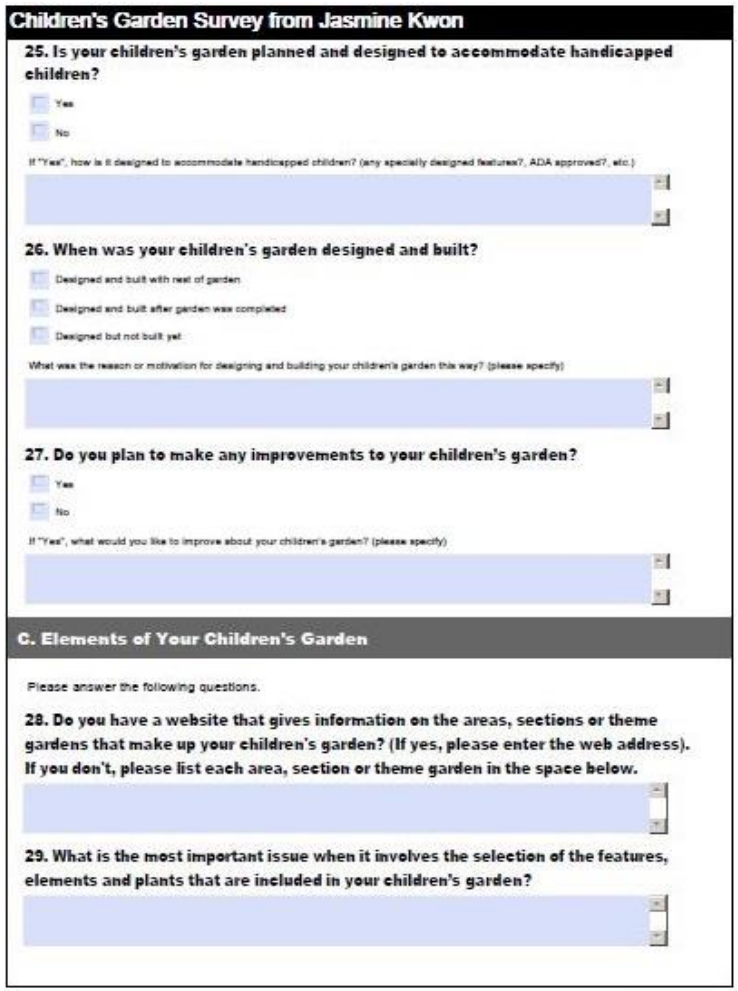
Appendix 3.Research questionnaire survey form (continued).



Children's Garden Survey from Jasmine Kwon

25. Is your children's garden planned and designed to accommodate handicapped children?

- Yes
- No

If "Yes", how is it designed to accommodate handicapped children? (any specially designed features?, ADA approved?, etc.)

26. When was your children's garden designed and built?

- Designed and built with rest of garden
- Designed and built after garden was completed
- Designed but not built yet

What was the reason or motivation for designing and building your children's garden this way? (please specify)

27. Do you plan to make any improvements to your children's garden?

- Yes
- No

If "Yes", what would you like to improve about your children's garden? (please specify)

C. Elements of Your Children's Garden

Please answer the following questions.

28. Do you have a website that gives information on the areas, sections or theme gardens that make up your children's garden? (If yes, please enter the web address). If you don't, please list each area, section or theme garden in the space below.

29. What is the most important issue when it involves the selection of the features, elements and plants that are included in your children's garden?

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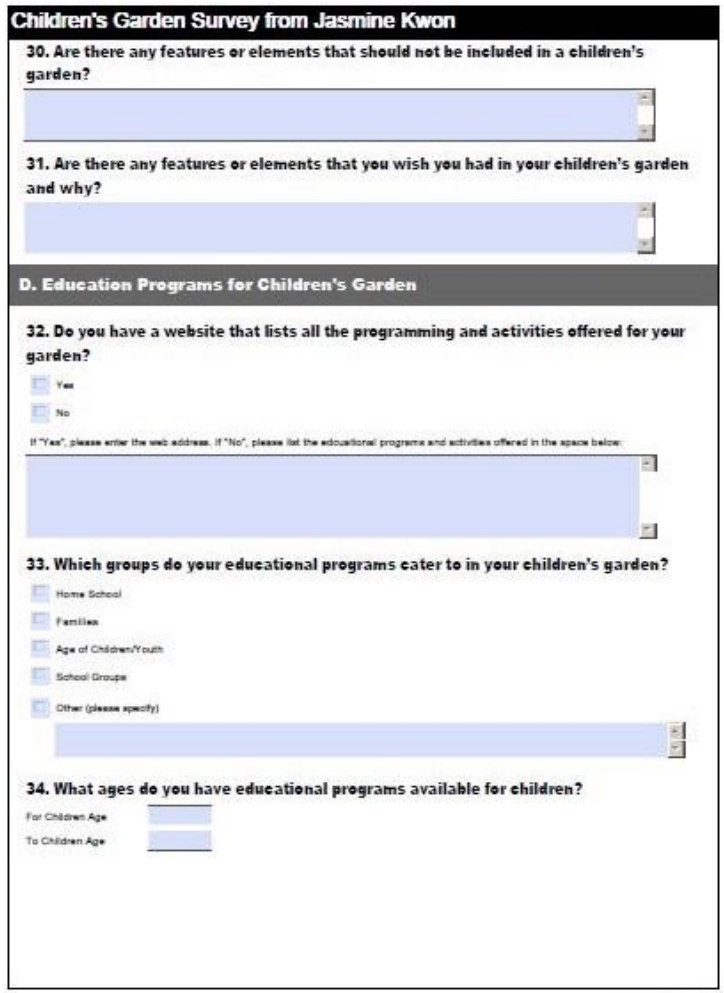

Children's Garden Survey from Jasmine Kwon

30. Are there any features or elements that should not be included in a children's garden?

31. Are there any features or elements that you wish you had in your children's garden and why?

D. Education Programs for Children's Garden

32. Do you have a website that lists all the programming and activities offered for your garden?

- Yes
- No

If "Yes", please enter the web address. If "No", please list the educational programs and activities offered in the space below:

33. Which groups do your educational programs cater to in your children's garden?

- Home School
- Families
- Age of Children/Youth
- School Groups
- Other (please specify)

34. What ages do you have educational programs available for children?

For Children Age

To Children Age

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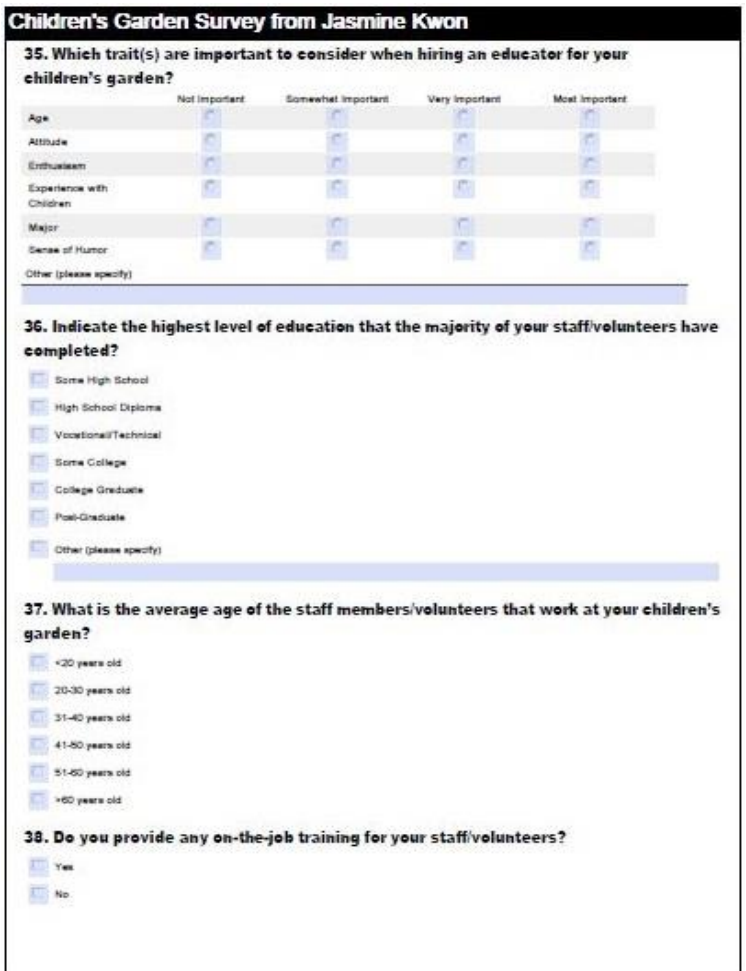
Appendix 3.Research questionnaire survey form (continued).



Children's Garden Survey from Jasmine Kwon

35. Which trait(s) are important to consider when hiring an educator for your children's garden?

	Not Important	Somewhat Important	Very Important	Most Important
Age				
Attitude				
Enthusiasm				
Experience with Children				
Major				
Sense of Humor				

Other (please specify)

36. Indicate the highest level of education that the majority of your staff/volunteers have completed?

- Some High School
- High School Diploma
- Vocational/Technical
- Some College
- College Graduate
- Post-Graduate
- Other (please specify)

37. What is the average age of the staff members/volunteers that work at your children's garden?

- <20 years old
- 20-30 years old
- 31-40 years old
- 41-50 years old
- 51-60 years old
- >60 years old

38. Do you provide any on-the-job training for your staff/volunteers?

- Yes
- No

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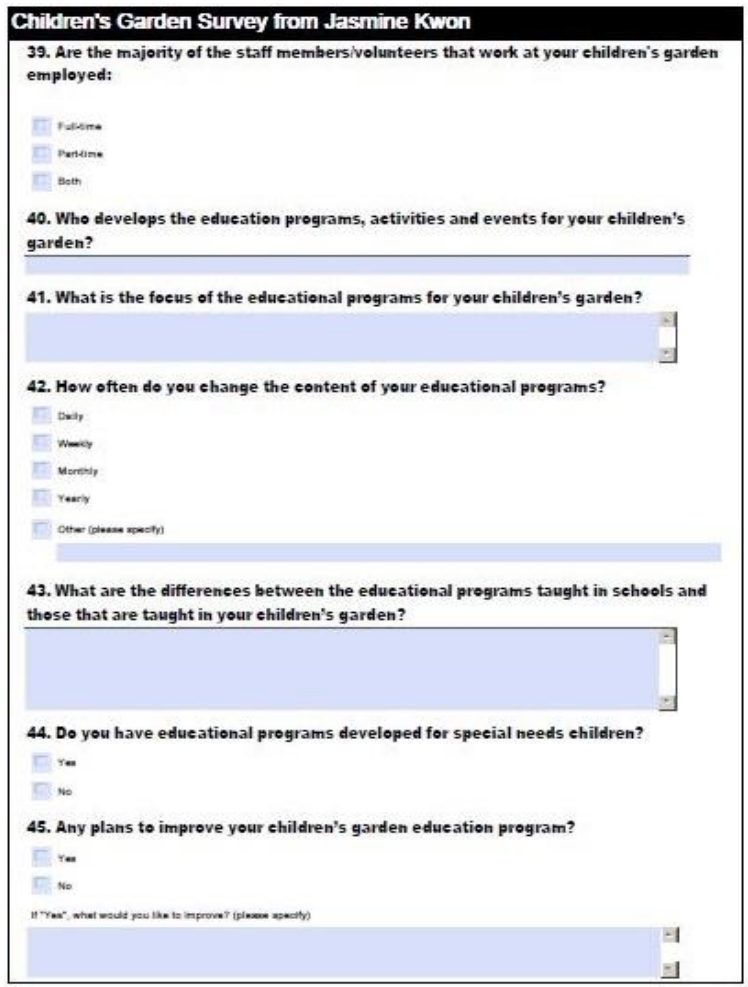

Children's Garden Survey from Jasmine Kwon

39. Are the majority of the staff members/volunteers that work at your children's garden employed:

- Full-time
- Part-time
- Both

40. Who develops the education programs, activities and events for your children's garden?

41. What is the focus of the educational programs for your children's garden?

42. How often do you change the content of your educational programs?

- Daily
- Weekly
- Monthly
- Yearly
- Other (please specify)

43. What are the differences between the educational programs taught in schools and those that are taught in your children's garden?

44. Do you have educational programs developed for special needs children?

- Yes
- No

45. Any plans to improve your children's garden education program?

- Yes
- No

If "Yes", what would you like to improve? (please specify)

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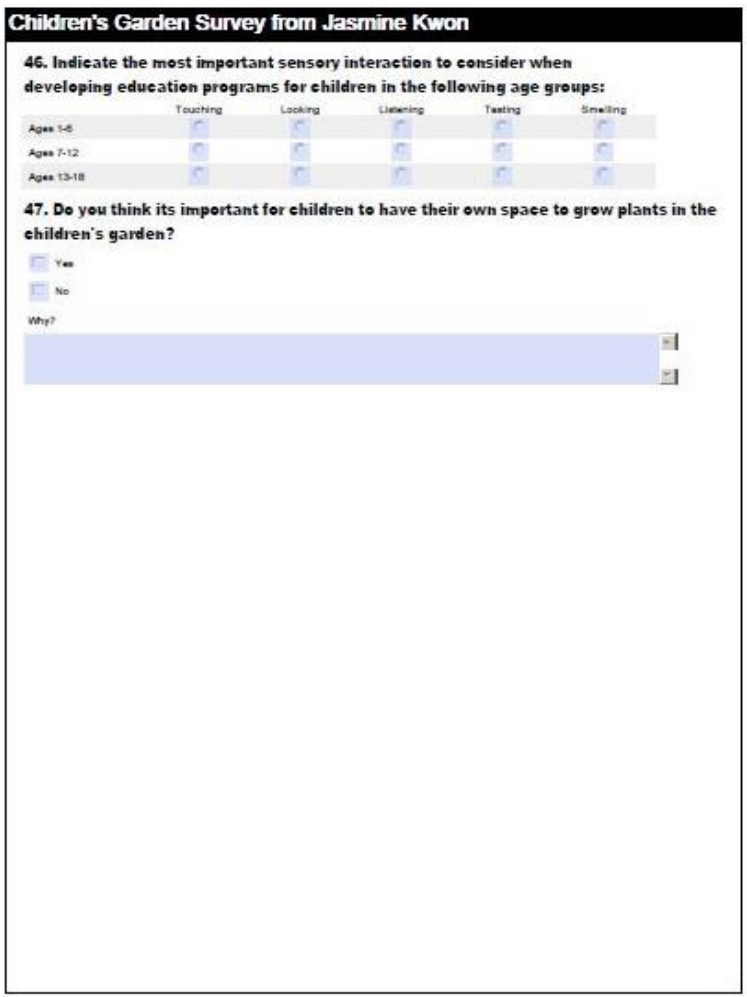
Appendix 3.Research questionnaire survey form (continued).



Children's Garden Survey from Jasmine Kwon

46. Indicate the most important sensory interaction to consider when developing education programs for children in the following age groups:

	Touching	Looking	Listening	Tasting	Smelling
Ages 1-6					
Ages 7-12					
Ages 13-18					

47. Do you think its important for children to have their own space to grow plants in the children's garden?

- Yes
- No

Why?

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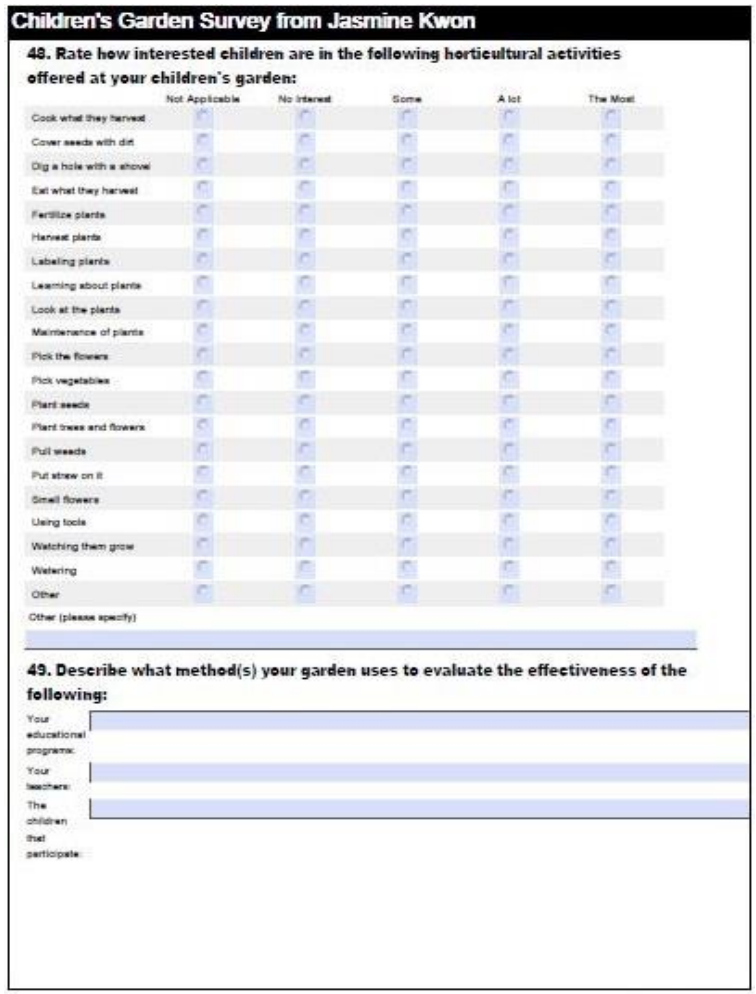

Children's Garden Survey from Jasmine Kwon

48. Rate how interested children are in the following horticultural activities offered at your children's garden:

	Not Applicable	No Interest	Some	A lot	The Most
Cook what they harvest					
Cover seeds with dirt					
Dig a hole with a shovel					
Eat what they harvest					
Fertilize plants					
Harvest plants					
Labeling plants					
Learning about plants					
Look at the plants					
Maintenance of plants					
Pick the flowers					
Pick vegetables					
Plant seeds					
Plant trees and flowers					
Pull weeds					
Put straw on it					
Smell flowers					
Using tools					
Watching them grow					
Watering					
Other					

Other (please specify)

49. Describe what method(s) your garden uses to evaluate the effectiveness of the following:

Your educational programs:

Your teachers:

The children that participate:

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Appendix 4. Respondents examined through discussions, interviews and review.

Affiliation	City and State	Name	Position	Information provided
Michigan State University	East Lansing, MI	J. L. Taylor	Creator and former curator of the MSU 4-H Children's Garden	Children's garden and confirmation of public garden and children's garden lists
AECOM Technology Corporation	Los Angeles, CA	H. Schaal	Principal landscape architect	Children's garden design
American Public Gardens Association	Kennett Square, PA	C. Sclar	Executive director	Confirmation of public garden list
Brooklyn Botanic Garden	Brooklyn, NY	M. Smith	Director, children's education &family programs	Children's garden and children's education program
Franklin Park Conservatory & Botanical Gardens	Columbus, OH	M.A. Miller	Community outreach & education manager	Reviews and feedback
The Gardens on Spring Creek	Fort Collins, CO	M. Provaznik	Executive director	Children's garden
Huntington Botanical Gardens	San Marino, CA	J. Folsom	Director of the botanical gardens	Children's garden and education program
Longwood Gardens Inc.	Kennett Square, PA	K. Trzaskos	School and youth programs coordinator	Children's education system and program
Meadowlark Botanical Gardens	Vienna, VA	K. P. Tomlinson	Manager and interpretive naturalist	Children's garden and function
The Morton Arboretum	Lisle, IL	A. Phelps	Public relations coordinator	Children's garden and children's education program
North Dakota State University	Fargo, ND	C.W. Lee	Professor, Department of Plant Sciences	Review of public garden lists and editing
Phipps Conservatory and Botanical Gardens	Pittsburgh, PA	C. Lawry	Environmental educator and outreach coordinator	Children's garden and management
San Diego Botanic Gardens	Encinitas, CA	L. Davis	Hamilton Children's Garden program manager	Children's garden and children's education program
San Diego Botanic Gardens	Encinitas, CA	S. Brueckner	Seeds of Wonder Children's Garden program manager	Children's garden and children's education program

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