

**ENHANCING THE EXPERIENCES OF BLIND AND VISUALLY IMPAIRED
VISITORS IN BOTANICAL GARDENS**

by

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**“If a man be wearied with overmuch study, there is no better place in
the world to recreate himself than a Garden, there being no sense but may be
delighted therein...”**

Author Unknown

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ABSTRACT

The purpose of this research was to determine what could be done at botanic gardens to enhance the experiences of blind and visually impaired visitors. This was done by determining if there is a discrepancy between what blind and visually impaired individuals feel would enhance their experience versus what botanic gardens are doing or would do to achieve the same means. Once findings were analyzed, recommendations were made as to what botanic gardens could do to enhance the experience of blind and visually impaired visitors.

Whether or not there was a discrepancy was determined through surveys administered to botanic gardens and blind and visually impaired individuals in a six-state region. Observations also were made regarding botanic gardens that currently have features installed to enhance the experience of blind and visually impaired visitors through field trips.

The findings indicated a discrepancy between what blind and visually impaired respondents desired and what botanic gardens thought should be implemented in botanic gardens to enhance the experiences of blind and visually impaired individuals. The blind and visually impaired respondents primarily desired audio stimuli while the botanic gardens desired features that would serve all visitors and be relatively easy to install. The findings also indicated that plant handling should be allowed and that there is a need for diversity of features in order to enhance the visit of all types of visually impaired visitors to the botanic garden.

Chapter One

INTRODUCTION

Background

In 1949, John J. Tyler Arboretum in Lima, Pennsylvania began a trend of installing gardens for the blind and visually impaired (B&VI) by providing an area primarily for the B&VI visitor. Emphasis in this garden was given to “fragrance of flowers, foliage or stems” and also to “interesting leaf and bark textures” (Floyd 1973). In 1955 the Brooklyn Botanic Garden established a fragrance garden near the administration building for B&VI visitors. The garden included herbs and scented plants labeled in Braille and beds raised to “fingertip height” (Floyd 1973). During the period of 1957 through 1965, federated garden clubs of various states located and instituted building of fragrance gardens throughout the United States (Floyd 1973). In 1961, the American Foundation for the Blind issued an opinion statement regarding special gardens for the B&VI.

Let us make it clear that we consider that the psychological impact of such gardens (Fragrance Gardens) in public parks to be one with plenty of punch...and definitely not in the direction of progressive concepts. They smack of isolation, segregation, paternalism, sentimentality, exploitation of the blind for others' benefit, and perpetuation of stereotypes...all distasteful to all blind persons with a consciousness of self (Floyd 1973).

In 1993 Brookfield Zoo, Brookfield, Illinois conducted a research project to determine how to deliver their message to those who cannot see signs. Through focus group research Brookfield Zoo determined their B&VI audience, what they

preferred as a means of interpretation and general information regarding B&VI visitors opinions of the zoo and what could be done so the zoo could reach them with their message (Jannings 1996). They found “There is no one audience of people with visual disabilities... only a small minority currently read Braille... making the zoo easily accessible to unaccompanied blind visitors is not readily achievable...those with little sight were eager for opportunities to use it...providing guides would not excuse us from providing direct experiences for these guests...getting the same information that is supplied on signs for the general public was not a value in itself...detailed three-dimensional sculpture is terrific, but some adults hesitated to touch it and low light levels caused many problems (Jannings 1996).”

Yet, in many public gardens in all areas of the country, there exists a garden specifically created for the B&VI visitor. In most instances such as the Frelinghuysen Arboretum, The Niagara Parks Commission Botanic Gardens, Staten Island Botanic Garden, Chicago Botanic Garden, and ZooMontana (Bondy 1998) the garden is a small part of the entire public area. Primarily these gardens boast Braille signage, and are the only location of visually impaired accessible signage in the entire garden, as well as plants with distinctive fragrances and textures, and sounds, usually created by moving water. Though research shows that The John J. Tyler arboretum installed the first garden designed specifically for B&VI visitors, the Brooklyn Botanic Garden asserts having the first fragrance garden in a botanic garden and it still exists today. Created specifically for the visually and physically challenged, this garden includes raised beds, plants with fragrance, texture or vibrant colors and Braille plaques in four main areas (Wang 1998).

These gardens are often placed in the center of the public garden, with no accessible signage leading the way to the location where there is

accessible signage. For those B&VI visitors that choose to visit alone, they miss out on much of the information being presented along the way to the visually accessible garden. Those visiting with a companion may still miss out on some information. Simply having a sign read to them is not as effective as teaching a person how to experience all of nature through the use of all available senses. According to a member of the Delaware Chapter of the American Council of the Blind, "Descriptions bore me, I need to be able to touch plants. Telling me the color of something doesn't help because I do not know what colors look like" (Delaware Chapter of the American Council of the Blind 1999). Quite often the first sign read to them is that at the entrance of a garden asking if they would please avoid handling the plants. These gardens specific for the B&VI visitor single out B&VI visitors. The majority of these visitors do not wish to be singled out and ushered to a specific garden because of their visual impairment; they want to experience the garden as whole just as a sighted visitor would.

The Braille signage in fragrance gardens for the B&VI typically describes fragrant and texturally interesting plants. In order to experience the fragrances and textures in a garden, the visitor needs time to learn the similarities and differences among plants. Quite often there are no seating areas in which a person can spend time discerning one fragrance or texture from another. There appears to be little consideration for the B&VI visitor throughout the site. There also appears to be little consideration of the B&VI community's opinions in the implementation of these areas in public gardens.

According to Aloma Bouma, Assistant Director, Community Relations for the National Federation of the Blind in a letter to the researcher dated May 19, 1999:

There is no need whatsoever for a special garden for the blind. Many blind persons do, indeed, enjoy touching or smelling flowers, just as many sighted people do. However, their sensations of smell and touch are not different from those of the sighted. In fact, the concept of special gardens for the blind has done a good deal of harm. There are a few instances throughout the country where this type of thing has been tried. It has almost always been initiated by well-meaning, misinformed sighted people and has generally been the object of jokes and derision on the part of the blind.

The concept of a special garden ignores the fact of the basic normality of the blind; it is commonly based on a false notion that the blind have a keener sense of touch or smell than the sighted and that they cannot get about in an ordinary garden used by ordinary people. The idea of a special garden for the blind is based upon a false concept and would be as much resented by the average blind person as a special garden for architects (designed on the same notions) would be resented by the average architect.

Likewise, Gerald M. Kass, Executive Vice President of the Jewish Braille Institute of America, states in a letter to the researcher dated May 3, 1999: "I believe we have learned over the last thirty years that for the vast majority of B&VI people, special sections at botanic gardens are of little value and in fact create the erroneous image that blind people could in no way visit such facilities unless special sections such as this exist".

According to the Lighthouse for the Blind, an organization dedicated to its mission of rehabilitation, education, and advocacy of visually impaired and blind individuals, more than ten million people in the United States, or one of every twenty, experience significant vision impairment that cannot be improved by corrective lenses (The Lighthouse, Inc. 1994). More than three and a half million individuals are severely visually impaired. As the average life span of people increases in America, there will be greater numbers of B&VI individuals (Halfmann, 1998). The primary visitor to botanic gardens and arboreta are middle-aged and older, well-educated, white

women (Korn et al 1998). Among the approximately 95.2 million people in the United States forty years and older more than 900,000 are legally blind (Prevent Blindness America, 1999). More than 2.3 million people forty years of age and older are considered visually impaired (Halfmann, 1998). Seventy percent of severely visually impaired persons are over the age of 65. Fifty percent of that group is legally blind (Braille Institute General Statistics on Blindness 1999). Because women generally outlive men, visual impairment statistics are over-represented in favor of women (Braille Institute General Statistics on Blindness 1999).

The answer to enhancing the visit of B&VI visitors at public gardens may not be to simply place Braille interpretive signs in the planting beds. The leading cause of vision loss is related to aging (Braille Institute General Statistics on Blindness 1999). Most older individuals retain some of their usable vision and typically use neither Braille nor a white cane (Braille Institute General Statistics on Blindness 1999). Research shows approximately 10% of the B&VI population in America reads Braille (Braille Institute General Statistics on Blindness 1999). The percentage is low because blindness and visual impairment most often occurs later in life and by that time learning Braille is not practical (Braille Institute General Statistics on Blindness 1999). A study by Gray and Todd in 1965 showed a close relationship between the ability to read Braille and the age at onset of blindness (Brabyn 1999). Of the congenitally blind, 72% were found to read Braille, whereas 11% of the group who had become blind after the age of fifty read Braille. Generally older people lack the tactile sensitivity required to learn Braille (Currency Features for Visually Impaired People 1995). About 75% of people who are legally blind can read printed material, using a combination of their own limited vision and visual aids that provide magnification and special lighting. Many can

read print if it is enlarged (Braille Institute Employers Frequently Asked Questions 1999).

While walking around most gardens today, one may only find Braille indicating whether a door opens to a men's restroom or a women's restroom, or if stairs are nearby. The American with Disabilities Act (ADA) regulations affect accessibility and removal of barriers, but there is little regulation regarding interpretation or signage.

For these reasons this research will stress the importance of using methods in the garden to encourage all of the senses. The research will emphasize the fact that many of the presented options benefit not only the B&VI visitor, but that they may also benefit any visitor to the garden.

A central goal of most institutions, as stated in their missions, is to educate their visitors; but how can they be educated if they cannot read the literature or signage in the planting beds? Botanic gardens' staff must work hard to encourage visually impaired individuals to visit their institution, to get the message out that there is more than just 'seeing' a garden and to diversify their audience.

Goals of Research

The primary goal of this research is to determine if there is a discrepancy between what visually impaired (B&VI) individuals feel would enhance their experiences in botanic gardens and what public botanic gardens (institutions) think should be done, or are doing, to achieve the same means. Based on this information, recommendations will be made to botanic gardens as to what they can do to enhance the B&VI visitors' experiences in botanic gardens.

Another goal of the research is to demonstrate how a garden may implement features for enhancing B&VI visitors' experience throughout the entire garden, rather than in one small area as is typically done in botanic gardens.

Chapter two discusses the methodologies used in the completion of this research as well as a description of the samples surveyed. Chapter three reveals the results of the research and Chapter four discusses them in relation to the goals of the research and the literature findings. The research is concluded and recommendations are made in the fifth chapter. Although all of the suggestions presented in the following research for enhancing the B&VI visitors' experiences to botanic gardens may not be appropriate for every garden, there is an option suitable for almost every garden.

Chapter 2

METHODOLOGIES

A preliminary literature search of magazines, journals, books, and sites on the World Wide Web was completed to determine any previous research in this area. The literature showed an extensive amount of research discussing plant selection for gardens for the B&VI. One study, "An Investigation into the Physical and Psychological Response of the Visually Handicapped to Some Selected Woody and Herbaceous Plant Material" by J. A. Floyd (1973) included, as part of the research, a survey to determine the effect of a garden solely for the blind but the results of that survey were not published in the final document. Another study explored how to reach the B&VI visitors to a zoo and dealt with interpreting the zoo's exhibits to those who could not see the signs (Jannings 1996). The literature also showed an extensive amount of research about whom the B&VI population is in America. However, the majority of the literature revolved around plant selection and had very little to do with interpretation, other than Braille signage, or with features for the B&VI visitor that could be incorporated into the entire garden and used by all visitors. There was also little found regarding what the B&VI visitors would desire in botanic gardens, the closest answer to this question came from the Brookfield Zoo study (Jannings 1996). Given the limited research on preferences of individuals with visual impairments a survey was deemed an appropriate means of gathering such information.

Measures

Two surveys were developed. One for B&VI individuals to be administered via telephone, email or in person and one for directors or visitor education specialists of botanic gardens to be administered via mail (Appendix A page 64). The B&VI individual survey instrument was field tested at a meeting of the Delaware Chapter of the American Council of the Blind. Three botanic garden staff members field-tested the survey instrument regarding institutions. Four field trips were taken to botanic gardens that have implemented features for blind or visually impaired visitors. Chicago Botanic Garden, Frelinghuysen Arboretum, Staten Island Botanic Garden and the Niagara Parks Commission Botanic Gardens were visited. These field trips were used to observe features and were the source to develop many of the questions on the survey instruments.

A petition for exemption from University of Delaware Human Subjects Review was sought and received. A copy of the exemption letter is in Appendix B page 75.

Sample and Data Collection

Institutions

One hundred and nine surveys were mailed to institutional members of the American Association of Botanic Gardens and Arboreta (AABGA) of Pennsylvania, Delaware, New York, New Jersey, Maryland, Virginia, and the District of Columbia (Appendix C page 77). Gardens in these states were chosen as recipients of the mail survey because of relative distance to the University of Delaware and Longwood Gardens and a better chance to increase response rate. Other selection criteria were

membership in the AABGA and a botanic garden open to the public. These public institutions are diverse and include historic houses, zoos, museums, arboreta, botanic gardens, and university campuses among others. Some are affiliated with the federal government, some with the state, county or city government, and some are supported by private endowments.

The surveys were addressed to the Director or Visitor Education Specialist at the institutions, knowing either of these positions at any institution is qualified to complete the survey. To ensure complete anonymity the surveys were not tracked. The institution staff was not asked to disclose the institution name on any part of the survey and was assured their answers would be kept confidential. Each survey packet sent on July 30, 1999 included the survey, cover letter (Appendix A page 64) and a return envelope marked with a deadline of August 30, 1999.

Blind and Visually Impaired Individuals

The primary source of B&VI individuals was organizations of and for the blind. The resource used to locate such organizations in the five states and Washington, DC was the Lighthouse for the Blind. A list of organizations supplied by and registered with the Lighthouse as organizations serving the B&VI population was obtained. Organizations from this list were contacted by letter or telephone asking for volunteers interested in participating in a survey to contact the researcher. A partial list of organizations contacted during this research can be found in Appendix D page 83. Volunteers had to be recruited because organizations would not disclose names and telephone numbers of members.

The only stipulation for being a volunteer in the survey was to have a visual impairment and to live in one of the states selected. The volunteers contacted the

researcher through email, telephone, or by letter to express their interest. In one case the president of the organization invited the researcher to a meeting to administer the survey in person. The remainder of the respondents was surveyed via email and telephone. Email seemed to be the primary choice of respondents as most were elderly and could not hear well on the telephone and preferred to write their answers. The telephone was used for some of the surveys and the rest were conducted in person at a meeting of the Eye Openers of the Point Pleasant/Brick Area. In all cases the survey instrument was read to the participant due to the nature of their disability. In the introduction read to all participants (Appendix A page 64) confidentiality was assured.

Data Entry and Analysis

The researcher entered all data into a computerized spreadsheet. Data were analyzed in terms to describe response distribution. Comments in response to open ended questions were analyzed by trends or patterns in responses and entered in table form. These were then used as direct quotes to highlight points made through responses to the quantitative analysis. They were also used to compare with responses of the other group surveyed. In certain tables, the responses were compressed into similar ideas and the frequency of that response was noted in the table.

Chapter Three

RESULTS

The primary goal of this research is to determine if there is a discrepancy between what B&VI individuals feel would enhance their visit to a public garden and what public botanic gardens would do, or are doing, to achieve the same means. The following chapter will provide the results to specific questions of the survey instrument.

Description of Respondents

Institutions

Of the 109 surveys sent, forty-one (41%) replied and eight were undeliverable and returned to the researcher. The surveys were returned in various states of completion and since each question stands alone it was decided that each survey would be used.

The number of public (52%) and private (44%) institutions that responded to the survey was similar as can be seen in Figure 1. This categorization refers to the funding sources of the institution. If the organization is private, it receives a majority of its funding from private sources such as private foundations, while public organization receive a majority of their funding from public sources such as governmental agencies.

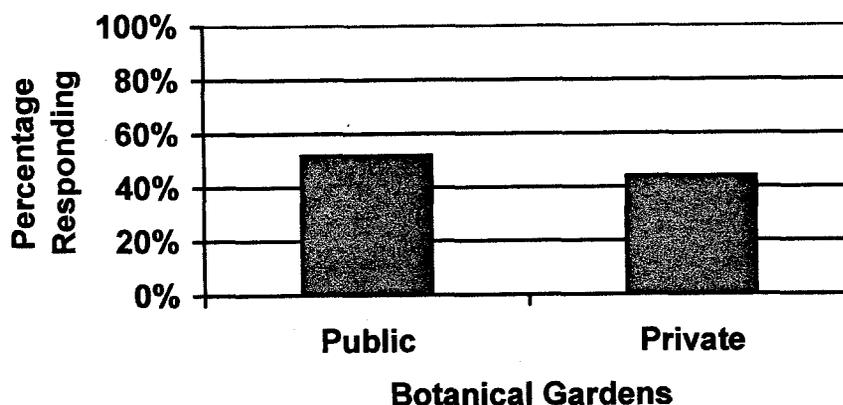


Figure 1: Public and Private Institutional Respondents

Most respondents are classified as 501(c)(3) non-profit institutions (87%) and open to the public (93%). The 7% that were not open to the public returned their surveys without answering the rest of the questions. Seventy four percent of the institutional respondents do not conduct demographical surveys at their institutions, and of the 26% that do conduct such surveys, 30% do not ask if they have blind or visually impaired visitors to their institution. Of the 26% of institutions that do administer demographical surveys 20% replied that they have B&VI visitors to their gardens and 30% replied that they did not.

Blind and Visually Impaired Respondents

Ninety- nine organizations were solicited for volunteers to complete the survey. From these, fifty-five individuals volunteered and thirty-seven (67%) completed

the survey instrument. Twenty-five (68%) of those thirty-seven were members of the Eye Openers of Point Pleasant/ Brick Area.

Figure 2 illustrates that the B&VI respondents were mostly female (72%), White (86%), over the age of 65 (44%), a high school graduate or higher (82%), and 51% have some college education. Figure 2 also shows that the majority of the respondents are visually impaired (61%), do not use a cane (58%) or a guide dog (97%), became blind or visually impaired later in life rather than born blind or visually impaired (86%), do not have multiple handicaps (86%) and do not read Braille (78%)
Figure 3, page 15.

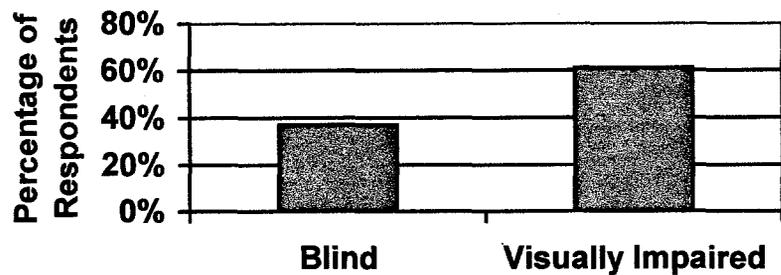


Figure 2: Percent Blind and Visually Impaired Respondents who are Blind versus Visually Impaired

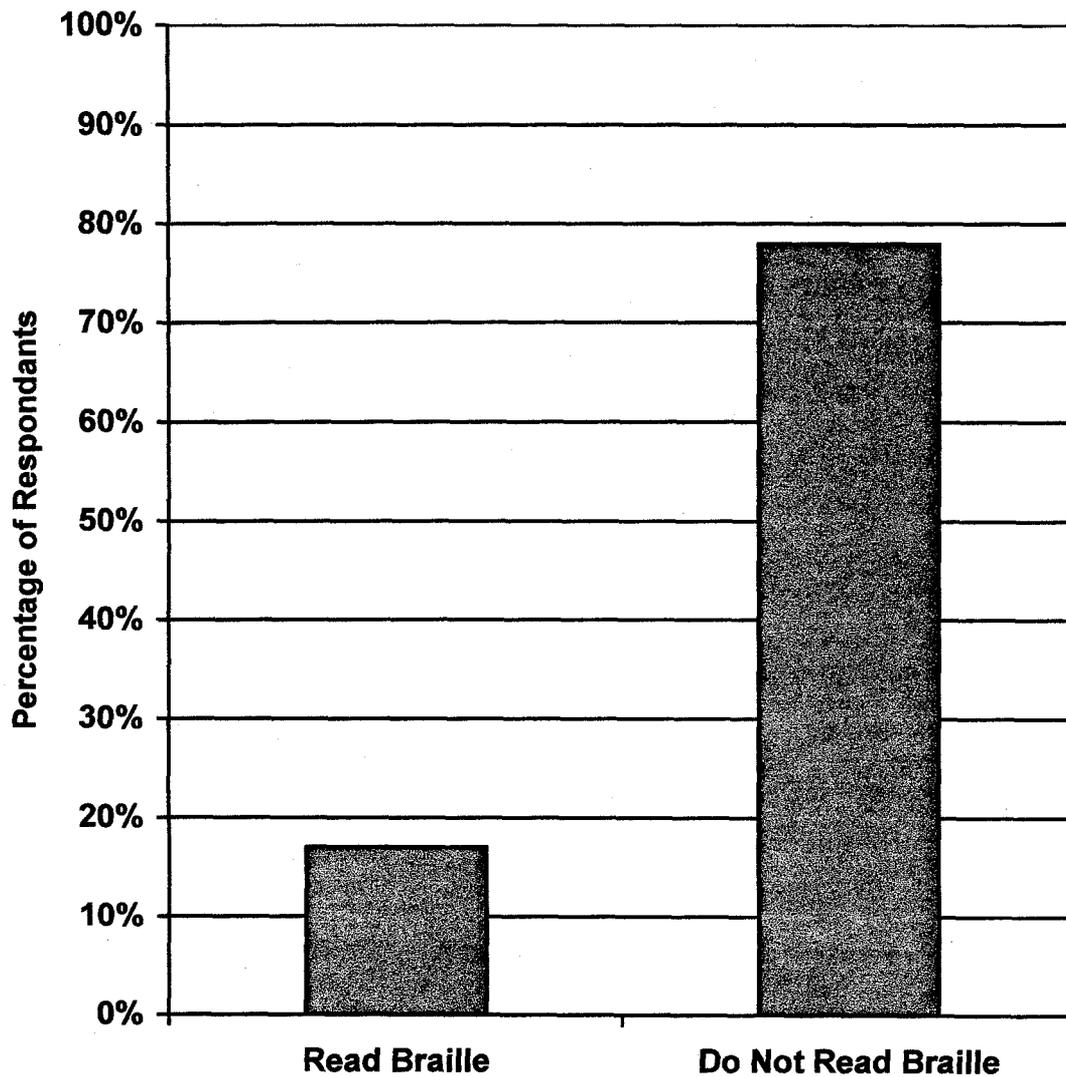


Figure 3: Percentage of Blind and Visually Impaired Respondents who Do Not Read Braille

Is There a Need?

The question “Do you feel there is a need for botanic gardens to address the B&VI visitor?” was asked on both surveys. Responses were similar. Both entities, the botanic gardens (87%) and the B&VI individuals (86%) felt there is a need to address the B&VI visitor to botanic gardens (Figure 4).

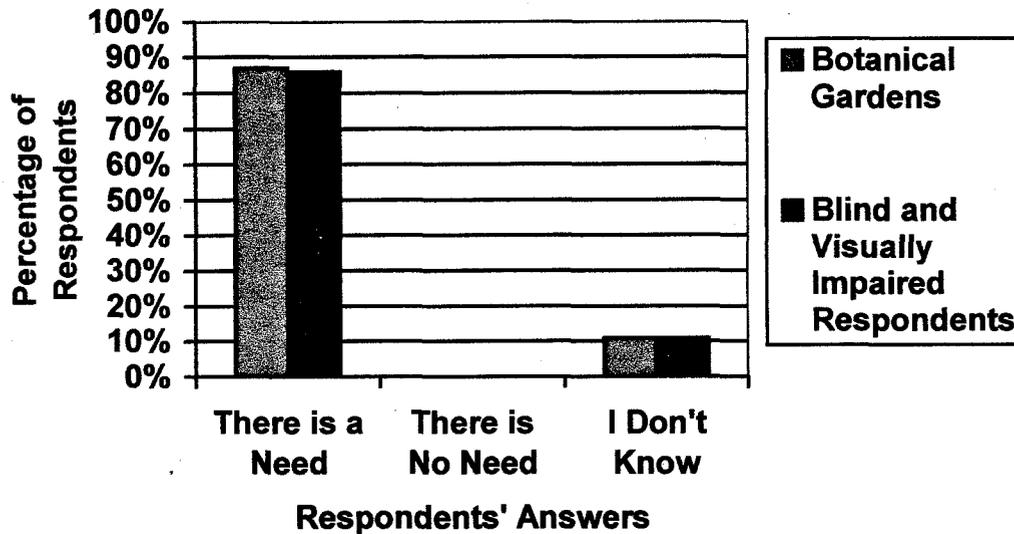


Figure 4: Percentage of Survey Respondents Who Think There is a Need for Botanic Gardens to Address Blind and Visually Impaired Visitors

Both the botanic gardens and the B&VI individuals were asked to explain why they felt there is or is not a need for botanic garden to address the B&VI visitor in an open ended question. Table 1, page 18, illustrates the responses of all individuals in all groups surveyed to this question as direct quotes from the surveys administered. No institution surveyed replied that there is *no* need for botanic gardens to address the B&VI visitor. Those that did not say there was a need replied that they had no opinion

of the matter. The institution that chose to explain their lack of opinion stated the following: "We are in a very rural area and so there is not a significant population". Those institutions that stated there is a need for botanic gardens to address the B&VI visitors had a variety of explanations for their answers, as did the B&VI visitors.

Table 1: Respondents' replies to free response question: "Why do you feel there is a need for botanic gardens to address blind and visually impaired visitors?"

B&VI Respondents	Botanic Gardens with Features for the B&VI Visitor	Botanic Gardens without Features for the B&VI Visitor
<p>Botanic gardens are not giving enough sensory gardens, not using enough of the other senses. Tour guides should be used more, a lot of gardens are lacking these.</p>	<p>Gardens for the visually impaired and disabled provide a wonderful opportunity for not only handling the plant material but provide an atmosphere of fellowship for them. It gives them a sense of purpose and gratification.</p>	<p>When possible botanic+ gardens should always create awareness/ knowledge centers for those with sensory impairments.</p>
<p>My family is not always good about reading signs to me. I need my needs addressed with audio stimuli.</p>	<p>The visually impaired group that visited our organization was incredibly thrilled to visit our arboretum, the enthusiasm they expressed made us feel that they should be welcomed at all gardens.</p>	<p>Part of the organizations mission should be to provide a quality visit to everyone.</p>
<p>For those of us who saw plants once before and had a garden it is nice to 'see' these plants again. We are people too and there are a lot of us.</p>	<p>We have had a significant increase in requests for information about garden experiences suitable for the visually impaired and an increase in visitation by such groups.</p>	<p>Botanic gardens should provide equal opportunities for all.</p>
<p>It would enhance the knowledge of what goes into a botanic garden and would help explain why certain plants are there.</p>	<p>If I were blind I would want to experience as many things as possible that did not require that sense, what better place than a garden?</p>	<p>There needs to more of a hands-on exhibit for visually impaired people.</p>

B&VI Respondents	Botanic Garden with features designed specifically for B&VI visitors	Botanic Garden without features designed specifically for B&VI visitors
<p>There has been a lot done for wheelchair access but that and visually impaired are two different things. We need more on tape, more guided tours, and permission to touch.</p>	<p>From working with visually impaired groups, I would say gardens in and of themselves are useful as sensory experiences, but there needs to be more in the area of signage, elevated beds, special trails, etc.; I found most visually impaired do not like “gardens for the blind” but like access to the garden as a whole.</p>	<p>There are many potential tie-ins, including the increasingly popular horticulture therapy programs.</p>
<p>We need to be able to enjoy it also.</p>	<p>All educational institutions should address the needs of visually impaired visitors.</p>	<p>It is a logical step; we have laws addressing ramps, steps, etc.</p>
	<p>Botanic gardens should address the B&VI visitors to the extent that our society expects all organizations to address the visually impaired.</p>	<p>Botanic gardens need to have an ADA plan that can be as simple and effective as having a staff member available to assist.</p>
	<p>Botanic gardens need to present more diversity and opportunities for visually impaired visitors.</p>	<p>Gardens are not simply a visual experience and should therefore offer the visitor (Visually impaired or not) the opportunity to engage all of the senses – hearing, touch, smell, and taste!</p>

B&VI Respondents	Botanic Gardens with features designed specifically for B&VI visitors	Botanic Gardens without features designed specifically for B&VI visitors
	Gardens should provide access points for all people to enjoy nature and natural beauty in an effort to engage them in accepting their role in stewardship of their environment. Also gardens provide a setting to improve the quality of life for all – promotes wellness.	B&VI visitors should be addressed only in terms of accessibility and interpretation.
	Our gardens, facilities, and programs need to be designed in a fashion to serve all populations. In particular gardens could do a better job of reaching this audience.	
	A handicap should not deprive an individual from enjoying the beauty that others receive.	
	We have a group of visually impaired individuals who come and enjoy our garden as any other visitor might, but some people might like to come individually and would want to feel as comfortable as when they are in a group, on a tour, or with a guide.	

B&VI Respondents	Botanic Garden with features designed specifically for B&VI visitors	Botanic Garden without features designed specifically for B&VI visitors
	Gardens should strive to have all publications/brochures on tape for handicapped visitors.	
	The more information we can get to the public about what they are seeing and experiencing, the richer the experience.	
	Plants and trees appeal to all senses.	

What Can Botanic Gardens Do?

B&VI respondents were asked, “What could a public garden do to help enhance your experience at their institution?” This was an open-ended question presented to respondents prior to being asked about specific features, while not all respondents replied to this question there were a variety of responses given. Table 2 illustrates all of the replies of the B&VI respondents to this question. The numbers in parentheses illustrate the frequency at which these responses were given.

Table 2: Blind and Visually Impaired respondents’ replies to the free response question “What could a public garden do to enhance your experience at their institution?”

Be allowed to touch the plants (25)*	Talking Tours (3)
Guided Tours (20)	Be sure tags are on all of the plants (2)
A lot of Benches (15)	Braille Signage (2)
Cassette Tape Tours (13)	Educational Programs geared towards the Blind and Visually Impaired (2)
Make the signs easy to read with large print at an accessible height. (12)	Pavement Changes as indicators (1)
Smelling/ Sensory Gardens for the Blind (5)	Landmarks (1)
Shelters from the Rain (4)	Signals where steps are (1)

* Numbers in parentheses illustrate the frequency at which the responses were given

Features

Next, B&VI individuals were asked to review a list of accessible features and select those that would enhance their experience at botanic gardens. Botanic gardens were given the same list of features, and were asked to indicate those they currently have at their gardens if any, and if they did not have any, those they would use if the resources were available to implement them. Two groups of botanic gardens

emerged, one currently has features designed specifically for the blind and visually impaired and the other does not. The former groups was asked why they have chosen to install the features they have and the latter was asked what they would install if given the resources to do so. All respondents were asked why they chose the features they did. Figure 5 illustrates the feature preferences of each of these groups. It is in these responses that a discrepancy emerges between the B&VI and the botanic gardens.

A discrepancy between these three groups, the B&VI, the botanic gardens with features and the botanic gardens without features, emerged from this question. The feature preference for each group is different.

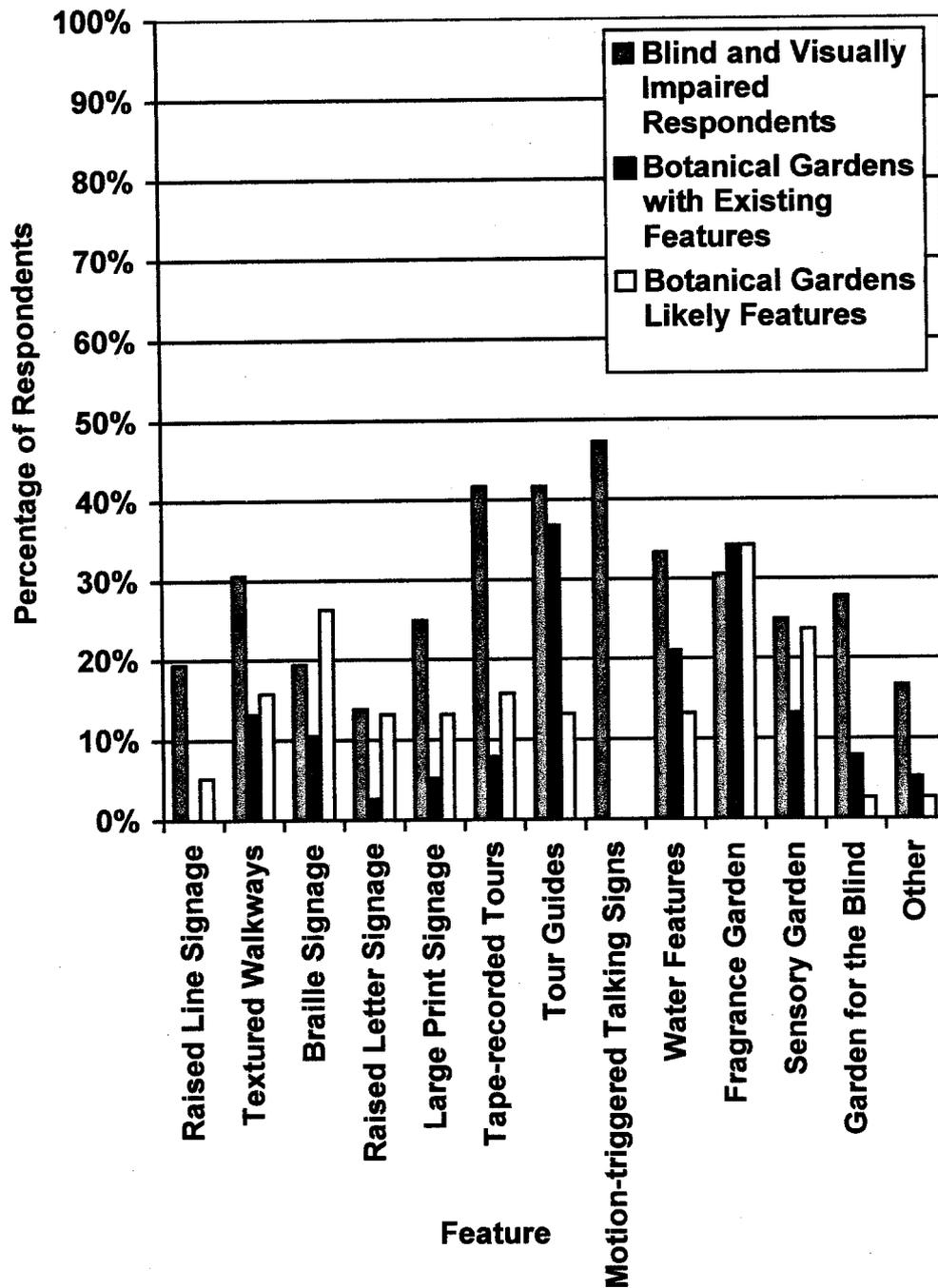


Figure 5: Preferences of All Survey Respondents of Features they Feel would Enhance the Experience of Blind and Visually Impaired Visitors in Botanic Gardens

It is clear in Figure 5 that all of the groups of respondents did not suggest the same features. As illustrated in Table 3 the three items most desired by the B&VI individuals to enhance their experiences in public gardens, are motion triggered talking signs, tape recorded tours, and tour guides, respectively. The three features most commonly implemented in botanic gardens that have features specifically for the B&VI are tour guides, fragrance gardens, and water features. The three features most likely to be implemented by botanic gardens if they had the resources are a fragrance garden, Braille signage, and a sensory garden.

Table 3: Three Most Frequently Suggested Features by Respondent Type

	B&VI Respondents	Botanic Gardens with features designed specifically for B&VI visitors	Botanic Gardens without features designed specifically for B&VI visitors
Most Desired Feature	Motion Triggered Talking Signs 47%	Tour Guides 38%	Fragrance Garden 34%
Second Most Desired Feature	Tape Recorded Tours 42%	Fragrance Gardens 34%	Braille signage 26%
Third Most Desired Feature	Tour Guides 42%	Water Features 33%	Sensory Garden 24%

Motion Triggered Talking Signs

The greatest discrepancy was the desire for motion triggered talking signs. Nearly 50% of B&VI respondents said this type of technology would greatly enhance

their experiences in public gardens. No institutions indicated that they are currently or would use this technology in their institutions.

Tape Recorded Tours

The second greatest discrepancy was that of the use of tape-recorded tours. A little over 40% of the B&VI respondents expressed that this type of interpretation would enhance their experience at botanic gardens. Some of the respondents stated that they had experienced this type of technology at museums and it worked well as long as it was non-sequential, meaning a visitor would not have to follow a specified tour route. Another respondent said tape-recorded tours would be second to tour guides because one cannot ask a tape-recorder a question. This is in stark contrast to the less than 10% of gardens currently using such methods and the less than 15% of gardens that would use it if they could. Those gardens that said they do use tape recorded tours or would if they had the resources said they selected this technology because it serves all visitors, not just the B&VI visitor and can be implemented without incurring much cost. An historic garden chose this option because it would not alter the look of an historic property.

Tour Guides

More botanic gardens than B&VI respondents think tour guides would enhance the experiences of B&VI visitors to the botanic gardens. Tour guides were the third most desired feature by B&VI respondents and the widest used in botanic gardens, but botanic gardens that have not implemented anything specifically for the B&VI are less likely to implement a tour guide in their garden. B&VI respondents stated that tour guides would enhance their experience in botanic gardens because a person can interact with the guide, as long as the groups were kept small. Approximately 12% of those institutions said they would implement tour guides if they

had the resources. Those that have implemented and would implement tour guides said they would do so because the tours can be tailored to the specific group as sensory tours, they are useful to all visitors, and appeal to all visitors. These institutions also replied that tour guides are essential for conveying information and monitoring behaviors and needs of a large group. An historic garden also chose this feature because it would not impact the look of the institution.

Large Print Signage

Another substantial discrepancy, this table illustrates is that of the use of large print signage. While 25% of the B&VI respondents stated they would find large print signage helpful, 5% of institutions said they used the signage and less than 15% of botanic gardens said they would implement the use of large print signage if they had the resources. Some B&VI respondents replied they did not choose this option because they did not have enough vision to read the large print. Another B&VI respondent stated that high-contrast large print signage is easiest for him to read.

Braille Signage

Eighteen percent of the B&VI respondents said Braille signage would enhance their experiences in botanic gardens. Some respondents stated that this would not enhance their experience at botanic gardens because they do not have the tactile senses necessary for reading Braille. Approximately 25% of botanic gardens would implement Braille signage in their gardens if they had the resources, while approximately 10% of botanic gardens currently implement this type of signage. An institution stated this as their choice because of the ease of installation of this type of signage.

Raised Line and Raised Letter Signage

Twelve percent of the B&VI respondents said they felt that this type of signage would enhance their experience at botanic gardens. None of the botanic gardens surveyed are currently implementing raised line signage and only 5% of institutions surveyed would implement the signage if they had the resources. Two percent of institutions have implemented raised letter signage, 11% of institutions surveyed indicated that they would implement it if they had the resources.

Textured Walkways

Approximately 30% of the B&VI respondents thought textured walkways would greatly enhance their experience in botanic gardens. Many stated that this type of wayfinding aid would help them to distinguish between different areas of the garden. Twelve percent of botanic gardens are currently using textured walkways in their gardens and 15% of institutions would implement textured walkways if they had the resources.

Water Features

Over 30% of the B&VI respondents said that water features would enhance their visit to a botanic garden. Twenty percent of the botanic gardens surveyed said they currently have water features in their institution and less than 15% of botanic gardens without features, specifically designed and installed for B&VI visitors, said they would implement water features to enhance the experience of B&VI visitors to their institution. The institutions stated that they would implement or have implemented these features because of their value to all their visitors.

Fragrance Gardens

Thirty percent of B&VI respondents stated that a fragrance garden would enhance their experience at a public garden. A B&VI respondent stated they chose this

option because it incorporates other senses besides vision. Another respondent stated that this type of feature would be of no use to them because of their severe allergies. Slightly more than one-third of botanic gardens surveyed have a fragrance garden already in place and a little more than one-third of those without features specifically for the B&VI said they would implement a fragrance garden for the B&VI visitor. Fragrance gardens were chosen because they could be implemented without incurring too much additional cost and they could appeal to all visitors to the gardens not just those who are B&VI. Institutions also felt that these gardens could be used as a learning aid in programs designed specifically for the B&VI visitor, are relatively easily installed and unobtrusive. One institution stated that this type of garden is well suited to their small garden, while another stated that they feel this type of garden would suit their audience of primarily 65 years of age and older visitors.

Sensory Gardens

Twenty-five percent of B&VI respondents replied that sensory gardens would enhance their experience in a botanic garden. Thirteen percent of botanic gardens surveyed currently have a sensory garden at their institution and 12% of botanic gardens without features said they would implement a sensory garden if given the resources. The reason stated for this choice in an institution was usefulness of the feature for every visitor to the garden.

Garden for the Blind

Twenty eight percent of the B&VI respondents stated that a 'Garden for the Blind' would enhance their experience at a botanic garden. Eight percent of gardens with features said they have implemented this feature in their garden and 3% said given the resources they would implement this type of garden into their institution.

Other

There were a variety of answers in response to the 'other' category of this question, in which all respondents were asked to explain 'other'. In this question respondents had the opportunity to list anything they felt would enhance the visit of B&VI visitors that was not listed on the survey instrument. The B&VI respondents said that benches in the fragrant areas for sitting and distinguishing the various smells would be helpful, as well as buttons on the signs that when pressed would cause the sign to talk. Audio clues along the walkway indicating areas of interest and way-finding landmarks were also mentioned. Some respondents felt that an area concentrated for the handicapped would enhance their experience. They stated for those that would want to experience the entire garden, there should be plants in each section that a visually impaired could feel and sniff as well as recorded information stops that would be of interest to all. Finally one respondent stated that a textured model of the garden would be good to give a person an idea of the layout of the garden.

The botanic gardens had different responses in regards to the 'other' category. Their responses included implementing special programs for the B&VI visitors to make the visit of value, enhancing the general fragrance of the gardens, planting beds at raised levels, and offering their brochures on tape.

Limitations

The discrepancy, between features selected by botanic gardens and those selected by B&VI individuals could be due to the fact that 53% of the botanic gardens that responded replied that they were unsure of available funding and resources to implement features to enhance the experience of B&VI visitors to their gardens.

Botanic gardens were asked “What are the limitations, if any, of your institution in including facilities to enhance the visually impaired visitor’s experience?” The botanic gardens were given six choices including ‘other’. Fifty-three percent of the botanic garden respondents also stated that lack of funds is a limitation to installing these features. Forty-seven percent of the respondents replied that not knowing what the needs are of visually impaired visitors is a limitation.

Plant Handling

The institutions surveyed were asked “Do you have a policy or philosophy regarding the handling of plant material at their institution?” The B&VI respondents surveyed were asked, “Would being able to handle plants enhance your experience at botanic gardens?” Figure 6 illustrates the responses of both groups to these questions.

Nearly 78% of the B&VI respondents said that being able to handle the plants would enhance their experience to the botanic garden. Sixty-one percent of the botanic gardens surveyed have a policy or philosophy regarding the handling of plant material. Only 2 of these institutions, however, have a strict hands-off policy regarding plants.

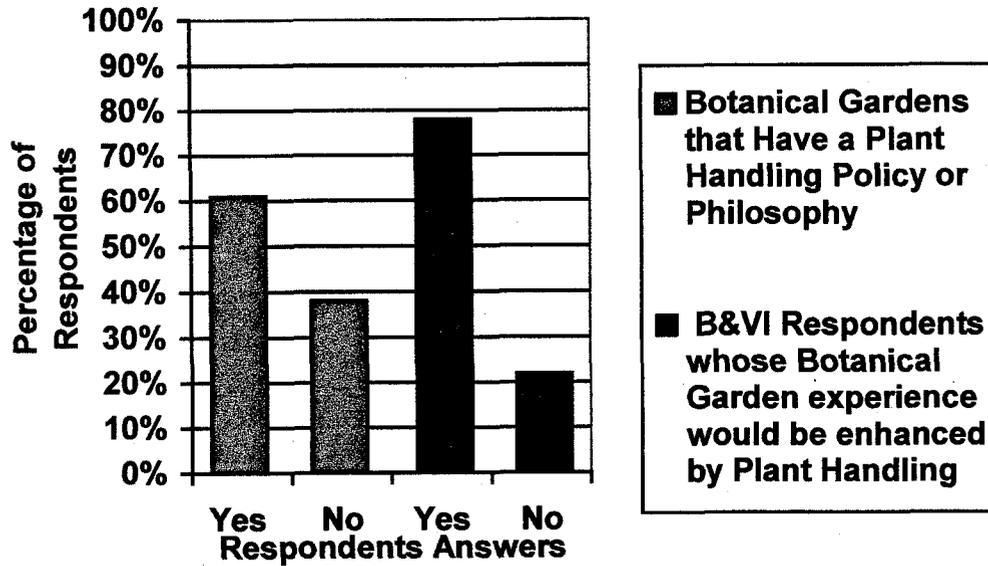


Figure 6: Percentages of Respondents' Replies to Plant Handling

Blind and Visually Impaired Visitors

The 69% of the thirty-seven B&VI respondents that stated they do visit botanic gardens were asked questions regarding their visits to these institutions. The greatest percentage of B&VI visitors (20%) visit the botanic gardens once a year, followed by more than six times a year and 'other'. When asked to explain their 'other' response, most replied "less than once a year." These B&VI visitors were also asked which season they visit the gardens and why. Nearly 50% of the respondents stated they visit the garden in spring, 33% said they visit in summer, 20% in autumn and 10% in winter. Some of those surveyed said they visit in spring because the flowers are beginning to bloom and the fragrance is strongest at this time of the year. Some responded that they visit during every season to experience the continually changing flower displays and seasonal differences in the garden. Many stated that they visit

when there are activities in the gardens that interest them. Many also stated that they visit the gardens in all seasons primarily for exercise.

Reasons for Not Visiting

Those respondents that stated they do not attend botanic gardens (31%) were asked from a list of reasons on the survey instrument, why they do not visit. If their reason did not appear on the survey they were asked to explain their reason. The majority of those surveyed responded that distance (91%) and lack of public transportation (91%) were the reasons for not visiting. These reasons were followed by never having an opportunity to visit (45%), inadequate facilities (18%), other (9%) and no interest in gardens (9%). In response to the 'other' category such reasons were stated as not knowing of a botanic garden close by and the association with gardens as a primarily visual experience and because of that, they do not have a desire to visit.

How are Botanic Gardens Doing?

Figure 7 illustrates how the botanic gardens surveyed feel botanic gardens in general are addressing B&VI visitors to their institutions. Forty-seven percent feel botanic gardens are doing a fair job in addressing B&VI visitors. No botanic gardens surveyed felt as though botanic gardens are doing an excellent job. Sixteen percent feel a good job is being done, 11% felt a poor job is being done and 2% of the respondents had no opinion.

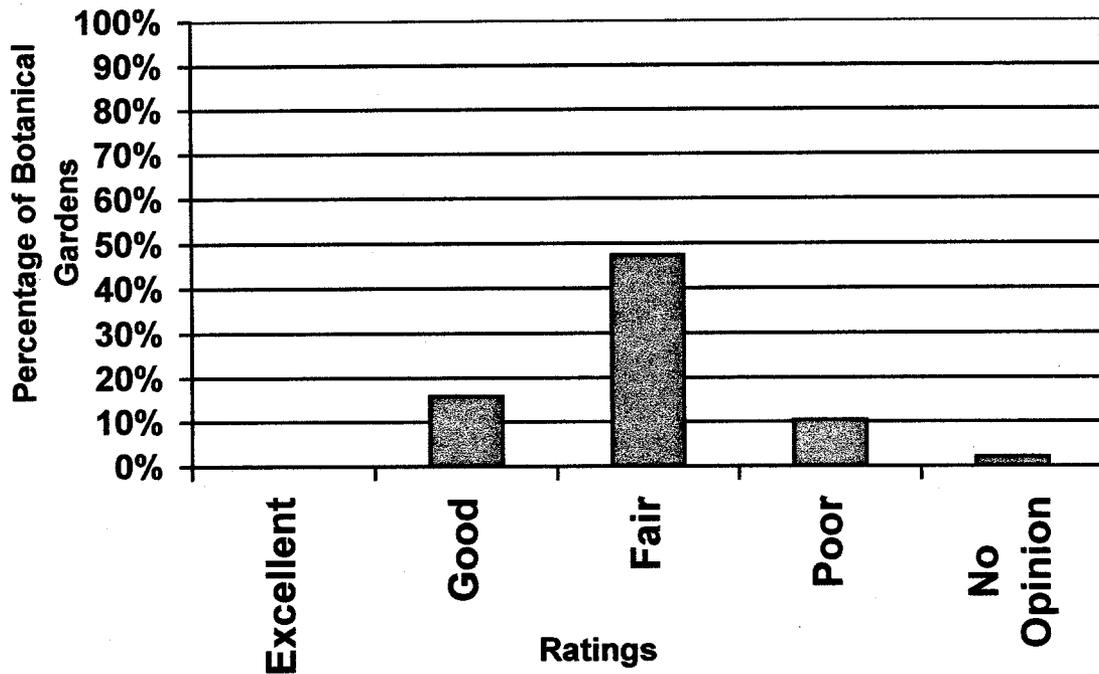


Figure 7: How Well are Botanic Gardens, in General, addressing the Blind and Visually Impaired Visitor, According to Botanic Gardens?

Summary

The results indicate a discrepancy between what botanic gardens feel would enhance a blind or visually impaired visitor's experience in botanic gardens and what B&VI individuals feel would enhance their visits. Both botanic gardens and the blind or visually impaired respondent feel there is a need for botanic gardens to address the visually impaired and blind population. Those B&VI individuals that do not visit botanic gardens primarily do not go because of distance and lack of transportation. The majority of those that do visit botanic gardens do so during spring because of the increased fragrances and the flowers just beginning to bloom, but B&VI respondents visit during every season. Most botanic gardens have a plant touching philosophy or policy and most B&VI respondents feel being able to handle plants would enhance their experience at botanic gardens. The botanic gardens surveyed feel that botanic gardens in general are doing a fair job of addressing B&VI visitors to their institutions.

Chapter Four

DISCUSSION

The fact that the majority of institutional respondents to the survey are classified as 501 (c) (3) non-profit institutions open to the public relates this research to botanic gardens across the country. Institutions were selected to participate and complete the survey if they were open to the public. If they did not have a garden open to the public the research did not apply to them because they would not have B&VI visitors to their facility. A variety of institutions responded making this research applicable to many types of organizations. A great number of the botanic gardens do not administer demographical surveys and of those that do very few asked if they have B&VI visitors to their botanic gardens. Many gardens stated that this was because they felt they did not have a B&VI visiting population large enough to warrant a survey or features to enhance their visit.

The majority of B&VI respondents were white females over the age of 65 with some college education. Most of these respondents are visually impaired, do not use a cane or a guide dog and became visually impaired later in life, as opposed to birth. They do not have multiple handicaps and do not read Braille.

According to the 1990 U.S. Census data there were approximately 3.7 visually disabled Americans in 1990 (Genesky 1994). The leading causes of low vision

and blindness are diseases that are common in old age. More than two-thirds of all people with low vision are 65 years of age and older (Nelson and Dimitrova 1993). It is estimated that more than 25% of all people over 85 years of age are visually disabled (Genesky 1994). As the geriatric population grows, the number of people with low vision and other age-related disabilities will increase (Genesky 1994). Due to the increasing number of older individuals with impaired vision due to minor eye diseases and the normal aging process, features that would enhance the experience of the B&VI visitors' experiences to botanic gardens would be of great benefit to a far wider population than that represented by the current statistics on blindness and low vision.

According to the Braille Institute, every 11 minutes a person in the United States loses their sight, often as part of the aging process. Seventy percent of severely visually impaired persons are age 65 or older. Fifty percent of that group is legally blind. Because women generally live longer than men, visual impairment statistics are overrepresented in favor of women (Braille Institute 1999). Just 2 percent of legally blind people use a guide dog; 35 percent use white canes (Braille Institute 1999). Also according to the Braille Institute, about 75 percent of people who are legally blind can read printed material, and only about 10 percent of people who are blind read Braille (Braille Institute 1999). These findings from the literature are a close match to those of this research.

The fact that both groups of respondents replied that there is a need for botanic gardens to address the B&VI population illustrates a lack of facilities in botanic

gardens to enhance the B&VI visitors' experience. One of the organizations that stated they did not know if there is a need for botanic gardens to address the B&VI people, cited that they are in a rural area and so they feel there is not a significant population of B&VI individuals to serve. According to the *Journal of Vision Impairments and Blindness*, among all persons who reported "serious difficulty seeing, even when wearing glasses or contact lenses," 33% live in cities, 37% live in suburbs, 28% live in non-metropolitan areas (such as small towns) and 1 percent live in farm areas. This illustrates that a botanic garden may have more B&VI visitors to their institution than they may think.

The replies to the open ended question found in Table 1, page 18, illustrate all of the different aspects a garden will have to contemplate when considering what they are doing, or will do, to enhance the experiences of B&VI visitors to their institution. Some of these respondents were once sighted and know what flowers and colors look like. Some of them have never seen a flower or a color and so descriptions of these would not be as informative to them as a different form of interpretation. Some have partial sight and some have no sight. This, too, is a factor to consider when implementing features in a botanic garden to enhance the experience of a blind or visually impaired visitor.

All of the institutions that responded saw addressing the needs of the B&VI population as a good and necessary responsibility. The B&VI individuals explained why they feel there is a need while the gardens explained how it would help and why

these features are necessary. Some of the gardens put themselves in the place of the B&VI individuals while others based their responses on experiences they have already encountered at their institutions, while still others looked at adding these features as ways to increase the activities offered at the organization. Table 1 illustrates all to be gained by creating and implementing features in a botanic garden that will enhance the visit of the B&VI visitor.

One of the most important findings of this research is the discrepancy between the features selected by the B&VI respondents and the botanic gardens as to what would enhance a B&VI visitor's experience to a botanic garden.

The three most desired features by B&VI respondents were motion triggered talking signs, tape recorded tours, and tour guides. The three features currently used by the most respondents were tour guides, fragrance gardens, and water features. The three features most likely to be implemented by botanic gardens surveyed are a fragrance garden, Braille signage, and a sensory garden.

When asked in an open-ended question, why these respondents chose the features they did it was evident that the B&VI respondents were taking into consideration different aspects of the features than were the botanic gardens. The B&VI respondents considered their situation and determined which would most help them in getting around and experiencing everything in the garden. In contrast, the botanic gardens appear to have chosen the features that are useful to all visitors to the

botanic gardens, are easiest to install at the least amount of expenditure. However, both entities selected tour guides.

Some botanic gardens are currently offering features at their institution that are useful to the B&VI visitor as well as to all visitors to the garden. For example, the Denver Botanic Garden offers a sensory tour to all visitors of the entire garden (Denver Botanic Gardens 1999).

This discrepancy appears to have emerged because the B&VI respondents are concerned primarily with audio stimulation. They want to be told and to hear all about everything throughout the garden. Many of the options to achieve this, such as talking signs, are bulky, expensive and/or unattractive. For this reason botanic gardens are less likely to implement audio features than they are something that will serve all of the visitors to a garden and not be a source of extra expense to the garden such as programs and gardens.

The discrepancy is greatest between what B&VI respondents desire and what botanic gardens would implement if they had the resources to do so. These gardens chose no audio stimulating features. Of the botanic gardens that currently have features, tour guides, an audio form of interpretation, are the most commonly used. This could be because the tour guide may already be a staff person used when a special groups comes through and so can perform other duties when not guiding a group.

Motion Triggered Talking Signs

The greatest discrepancy in this research was the desire for motion-triggered talking signs. These are currently used in museums, such as the Smithsonian, and aquariums, such as the National Aquarium in Baltimore, and begin talking when the motion of a visitor triggers a sensor. While half of the B&VI respondents replied that this technology would enhance their experiences in botanic gardens, none of the botanic gardens replied that they would install this technology. One of the greatest problems in a public garden for the B&VI visitor is knowing when they are in front of something that is being described by a sign. When there is a sign speaking to them, letting them know when they are in front of an important feature in the garden, they no longer have to ask or rely on another for their assistance.

There are a number of problems associated with this technology from a botanic garden standpoint as evidenced by the fact that not one botanic garden respondent chose this as a feature they would implement or are currently using in their garden. Some of the problems with this technology include aesthetics, cost, utility and practicality. The signs can be quite bulky and unattractive, and if a sighted visitor wants to read the message on the sign without hearing it there is no way for them to do so. The electronic component of the motion-triggered talking signs also may prohibit their use in the elements outside in a botanic garden. The constant on and off of the sign may cause a distraction to other visitors to the botanic garden.

An alternative to this technology that would achieve the same means without the distraction and is currently being used outside in the elements of cities is Talking Signs ®. This technology requires no installation of new signs.

Talking Signs ® technology is an infrared wireless communications system that provides remote directional human voice messages that make confident, independent travel possible for vision impaired and print-handicapped individuals. The technology was pioneered and developed at Smith-Kettlewell Eye Research Institute, Rehabilitation Engineering Research Center in San Francisco, California. The system consists of short audio signals sent by invisible infrared light beams from permanently installed transmitters to a hand-held receiver that decodes the signal and delivers the voice message through its speaker or headset. The signals are directional, and the beam width and distance can be adjusted. The system works effectively in both interior and exterior applications.

Talking Signs ® may be used wherever landmark identification and wayfinding assistance are needed. To use a Talking Signs® system, the user scans the environment with the hand held receiver. As individual signals are encountered, the user hears the messages. For example, upon entering a lobby, one might detect “information desk” when pointing the receiver directly ahead, “public telephones” when pointing to the right and “stairs to the second floor” when pointing to the left.

Messages are unique and short, simple and straightforward. The messages repeat, continuously identifying key features in the environment (Talking Signs ® 1999).

This technology could be applied in the botanic garden itself, as well as in the lobbies, visitor centers, restrooms and stairways. The transmitters could be installed on all signs along roadways to indicate where the path goes and what is along that path.

This may be an expensive technology to incorporate into a garden, since it would only be beneficial to those who are visually impaired or blind. It requires no

additional signage installation, but it does require the purchase of the technology. Contact information for Talking Signs can be found in Appendix E, page 84.

Tape-recorded Tours

Tape-recorded tours presented the second greatest discrepancy between botanic gardens and the B&VI respondents. Just as the B&VI respondents desired audio stimulation through the use of talking signs, the same is desired through the use of tape-recorded tours. These are readily obtained and the technology is used in museums already. They are easily updated and inexpensive to implement. Some of the B&VI respondents expressed concerns regarding the lack of interaction between tape-recorded tours and the visitor. Companies such as Acoustiguide Corporation and Antenna Tours, Inc create audio tours for museums such as the Riverfront Arts Center and the Philadelphia Art Museum, and may be able to create an audio tour for a public garden. Please see Appendix E, page 84 for a listing of audio tour creators.

Tour Guides

Tour guides offer the audio stimulation that seems to be so desired by this group of respondents. Tour guides promote interaction and learning. The tours can be adjusted for a particular group or for a particular person's interests. Tour guides were the third most desired feature by B&VI respondents and the most widely used of all features in the botanic gardens that responded.

Large Print Signage

This was also a great discrepancy between the B&VI respondents and the botanic garden respondents. One quarter of the B&VI respondents stated that this type of signage would enhance their experiences at botanic gardens. Five percent of botanic gardens use this technology while 15% would use it if they had the resources to do so. According to the Braille Institute, about 75 percent of people who are legally blind can read printed material, using a combination of their own limited vision and visual aids that provide magnification and special lighting. Many can read print if it is enlarged (Braille Institute 1999). The Brookfield Zoo study found that their B&VI focus group participants felt the large print literature and signage was too conspicuous (Janning 1994). This type of signage can be used by all visitors to the botanic garden and would require replacement of existing signage in the garden. According to the Americans with Disabilities Act Accessibility Guidelines (ADAAG) (The Lighthouse, Inc 1994) characters on building signage “shall be sized according to the viewing distance from which they are to be read. The minimum height is measured using an upper case X and lower case characters are permitted. Letters and numbers on signs shall have a width-to-height ratio between 5:5 and 1:1 and a stroke-width-to-height ratio between 1:5 and 1:10. Please see Appendix E, page 86 for a list of companies that create signs in adherence to ADA standards.

Braille Signage

One quarter of botanic gardens without features for the B&VI stated they would implement Braille signage at their institutions if given the resources. Research shows that a small fraction of B&VI people can read Braille. Seventeen percent of the B&VI persons surveyed replied that they have the ability to read Braille. Throughout the United States 10% of the B&VI people have the ability to read Braille. This information also is in agreement with the Brookfield Zoo study. One of the research conclusions was that a small fraction of B&VI persons read Braille (Jannings 1994). This type of signage would serve only a small percent of the B&VI population. Providing Braille signage would entail the installation of new signage throughout the gardens in addition to the signs that currently exist. This is also technology that is useless to most older visitors to the botanic garden. Research shows as an individual ages tactile sensitivity is diminished and it becomes difficult to differentiate one Braille letter from another. As stated earlier the average life span of the population is increasing and as this continues to happen, botanic gardens will have a greater number of guests aged sixty-five years of age and older. Because most blindness in America is caused by aged-related diseases and aging in general, it stands to reason that there will be more B&VI visitors to public gardens that do not have the ability to read

Braille. According to the ADAAG, “Braille is required on signage for permanent rooms and spaces. Directional and informational signs about functional spaces are not required to use [Braille], however this would facilitate independent use of the building by people with impaired vision (The Lighthouse, Inc 1994).”

Raised Line and Raised Letter Signage

Very few of the institutions have implemented or would implement either of these types of signage. These signs and literature rely on the same tactile method of reading that Braille signage does. Raised line signage is typically used for wayfinding and maps while raised letter is used for interpretation. The advantage these have over Braille signage is that they can be used by any visitor to the botanic garden. The ADAAG states that raised characters are also required on signage for permanent rooms and spaces. “Letters and numerals shall be raised 1/32 in upper case, sans serif or simple serif type and shall be accompanied by Grade 2 Braille. Raised characters shall be at least 5/8 inch high, but no higher than 2 inches. The characters and background of signs shall be eggshell, matte, or other non-glare finish. Characters and symbols shall contrast with their background – either light characters on a dark background or dark characters on a light background (The Lighthouse, Inc 1994).”

Textured Walkways

Textured walkways are used as a means of wayfinding in botanic gardens. They can indicate changes in area, type of plants, or if there is a sign at a particular location. Thirty percent of the B&VI said this would enhance their experience in

botanic gardens. Very few botanic gardens stated they would implement such technology. The primary reasons for not implementing the textured walkways are the inability to install the walkways easily and for low cost. These walkways have the potential for benefiting all who visit the garden. Some visitors may not notice the subtle differences from one area to another and the change in pavement, if well interpreted, would help them to see they have moved into a new section of the garden. Textured walkways also benefit all visitors to the garden by preventing the pavement from becoming slippery in inclement weather. Textured walkways can be created by inserting a strip of a different kind of paving material in the walkway when there is a transition from one display to another. Most hardscape suppliers should be able to provide information on paving materials for botanic gardens. Two very common organizations are E.P. Henry <http://www.ephenry.com/> and Anchor Block Company <http://www.anchorblock.com/>. Other sources of hardscaping material can be found in Appendix E page 84.

Water Features

Water features delight almost all visitors to a public garden. They encourage the use of sound and touch in the garden. They may serve more of a purpose than just to sound pretty and feel good. In 1965 Strybing Arboretum and the Bay Area Garden Clubs established the first Garden of Fragrance on the West Coast (Floyd, 1973). This garden was the first to introduce water not for sound effects but for rinsing hands to remove the aroma of plants before trying new ones (Floyd 1973).

Fragrance Garden

Organizations of and for the blind stated these types of gardens “smack of isolation, segregation, paternalism, sentimentality, exploitation of the blind for others’ benefit, and perpetuation of stereotypes...” yet thirty percent of the B&VI respondents stated that a fragrance garden would enhance their experience in a botanic garden. Also approximately one-third of botanic gardens surveyed responded they would implement or have implemented such a feature in their institution. This is the one feature in which all three surveyed groups agreed. Two websites offering good lists of fragrant plants are:

Botanicals: Fragrant Plants at http://www.thefragrantgarden.com/b_fragrant.html

Garden Forever: Gardening for the Senses at

<http://www.gardenforever.com/pages/artsenses.htm>

Sensory Gardens

One quarter of the B&VI persons surveyed stated that a sensory garden would enhance their visit to a botanic garden. These have the potential to be useful learning tools for sighted and B&VI visitors. They could also be used as a training ground for teaching individuals how to experience the rest of the botanic garden. They could be created from an existing planting bed or created in a new area of the garden. There are many institutions currently implementing a sensory garden in which the use of the senses of touch, audio, smell, and even taste are encouraged in addition to the sense of sight. This garden can be used as a way to teach every visitor that there is more to

going to a garden than looking at the flowers. Many of the researchers field trip sights included a sensory garden. There are many throughout the country and they are not limited to locations in botanic gardens, they are at museums as well. For example, The Ellen Noel Art Museum of the Permian Basin in Odessa, TX installed a sensory garden in June of 1999 that included plants, sculpture and “raised, large-letter signs for the visually impaired. The garden also has a sign explaining how to touch and smell the plants without damaging them. Audio tours of the plantings and sculptures also are available. Hoping to attract the blind to their museum, heretofore a largely visual experience, the Ellen Noel Art Museum of the Permian Basin opened the George and Milly Rhodus Sculpture Garden. The garden is a smell, touch and feel experience that museum officials hope will offer a new way for the roughly 6,000 legally blind people in the Permian Basin to appreciate art (Associated Press 1999).”

Garden for the Blind

Nearly one-third of the B&VI respondents stated that this type of garden would enhance their visit to a botanic garden. This is in contrast to the opinions of organizations of and for the blind. Aloma Bouma, Assistant Director, Community Relations for the National Federation of the Blind stated, in a letter to the researcher dated May 19, 1999,

“There is no need whatsoever for a special garden for the blind. The concept of special gardens for the blind has done a good deal of harm.

The concept of a special garden ignores the fact of the basic normality of the blind; it is commonly based on a false notion that the blind have a keener sense of touch or smell than the sighted and that they cannot get about in an ordinary garden used by ordinary people.”

Gerald M. Kass, Executive Vice President of the Jewish Braille Institute of America, shares a similar opinion in a letter to the researcher dated May 3, 1999, “I believe we have learned over the last thirty years that for the vast majority of B&VI people, special sections at botanic gardens are of little value and in fact create the erroneous image that blind people could in no way visit such facilities unless special sections such as this exist”. He goes on to state, “We live in an area where blind people have been mainstreamed and we must take care not to create segregated facilities when it might be totally unnecessary. For the most part, facilities created in botanic gardens for the blind are visited only by groups from agencies for the blind and possibly homes for the blind and this practice is definitely diminishing.”

These gardens are typically similar to the fragrance gardens and sensory gardens include Braille signage and encourage the use of the other four senses. They simply have the title “Garden for the Blind”.

Other

It is interesting that in the ‘other’ category of the survey B&VI respondents provided such answers as benches and plants in every area of the garden

that can be touched and smelled. Botanic gardens suggested programs that would enhance the experiences of the B&VI to their gardens.

A cause for these discrepancies in feature selection may be the limitations of botanic gardens in implementing such features. The greatest limitation botanic gardens expressed as reasons for not installing features for B&VI visitors were being unsure of available funding sources, a lack of funding, and confusion as to what the needs are of B&VI individuals. This helps to explain the choices of the botanic gardens of features they would implement to enhance the B&VI visitors experiences. The botanic gardens primarily chose to implement the options that would cost the least amount and would serve the most visitors to their institutions. Though this would seem to be a typical and prudent choice on the part of the botanic gardens, the choice may have been made out of confusion and ignorance. Should the institution become familiar with the needs of B&VI visitors and available funding sources, they may choose to implement features other than the ones they currently have in their gardens.

From the results gathered it also appears there is a great misconception among the B&VI that they are not allowed to handle the plants. This proves to be frustrating because the majority of the B&VI respondents replied that the ability to handle the plants would enhance their visit to botanic gardens. In fact, the majority of the botanic gardens have a policy or philosophy regarding the handling of plants, but the policy or philosophy allows handling in most cases. The policy or philosophy most often prohibits the mutilation or removal of plants.

If a botanic garden is going to implement features in their gardens to enhance the experience of B&VI visitors it is important to know when those B&VI visitors come to the gardens. The more that is known about B&VI visitors to botanic gardens the better able botanic garden will be to enhance their experiences. Knowing

that the majority of B&VI visitors visit in Spring because it is the time when the fragrance is strongest and the colors are the brightest and flowers are just beginning to bloom will help botanic gardens to know what they should interpret and when.

Just as it is important to know when and why B&VI people visit the gardens it is important to know why B&VI people do not visit the gardens. When those B&VI respondents that replied they do not visit botanic gardens were asked why, their primary reasons for not visiting botanic gardens were distance and lack of public transportation. Because the B&VI respondents cannot drive they have to rely on another person's schedule in order to visit a botanic garden. Some of the respondents felt that gardens were a visual experience and never even considered visiting the gardens feeling that it would be hopeless or a waste of time. Still other respondents felt that there are inadequate facilities at the botanic gardens and would not feel comfortable visiting. Finally some of the B&VI respondents said they did not know of any botanic gardens around them and never had the opportunity to visit. These reasons illustrate the need for botanic gardens to learn who is visiting their institution versus who the residents in their local communities are.

The fact that none of the botanic gardens surveyed feel botanic gardens in general are doing an excellent job in addressing the B&VI visitor, that there is such a discrepancy in feature choice and a great misconception regarding plant handling shows that more could be done in the area of enhancing the experiences of B&VI visitors to botanic gardens.

It appears that the discrepancy between what is desired by B&VI individuals and botanic gardens is largely based on funding and ignorance as to what is needed or desired by a B&VI visitor to a botanic garden. The handling of plants is also a point of contention between the two groups or respondents. It appears, however that

there is a great misconception on behalf of B&VI visitors that they may not touch plants, which is simply not true. This misconception has come about due to a lack of adequate communication on behalf of the botanic gardens.

These discrepancies are not the only ones that have come out in this research. There also appears to be a discrepancy between what organizations of and for the blind think of special gardens such as sensory and fragrance, and what B&VI persons desire in a garden.

The following chapter will discuss recommendations regarding how these discrepancies may be alleviated.

Chapter Five

CONCLUSIONS AND RECOMMENDATIONS

The following conclusions were drawn from the results of the survey administered to B&VI individuals and botanic gardens as well as from literary research done to substantiate the results of the survey results. Recommendations for botanic gardens based on these conclusions follow.

Conclusions

1. B&VI individuals visit botanic gardens.
2. There is not a typical person who is blind or visually impaired. There are many different groups with very different, sometimes conflicting, needs and interests that may depend on what point in life a person became blind or visually impaired and how complete the vision loss is.
3. Very few B&VI individuals read Braille. This was also a conclusion of the Brookfield Zoo study and a statistic presented by the Braille Institute.
4. According to a literature review and research regarding blindness and visual impairment conducted by the researcher, blindness and visual impairments are a growing problem in the United States because of the increased average age of the population. As the geriatric population grows, the number of people with low vision and other age-related disabilities will increase. Due to the increasing number of older individuals with impaired vision due to minor eye diseases and the normal aging process, features that would enhance the experience of the B&VI visitors'

experiences to botanic gardens would be of great benefit to a far wider population than that represented by the current statistics on blindness and low vision.

5. There is a discrepancy between what the B&VI feel would enhance their visit and what has been done or would be done by botanic garden to achieve the same means. The B&VI have a preference for audio features supplemented by features stimulating the other senses of smell, touch and taste.
6. There is a misconception regarding plant handling on behalf of the B&VI.
7. Not many botanic gardens know if there are B&VI visitors to their institutions.
8. A number of different options for B&VI visitors must be presented in a botanic garden. Options for those with some sight must be presented along with features for those with no sight, keeping in mind that the majority of these options can be used by any individual with the potential of enhancing their experience in botanic gardens.
9. Confusion as to what funding sources are available, a lack of funding and confusion as to what would suit the needs of B&VI individuals are the primary limitations cited by the botanic garden respondents for not implementing features to enhance B&VI experiences in botanic gardens.

Recommendations

Administer Demographical Surveys

Demographical surveys must be administered before any features can be implemented in a botanic garden to enhance the experience of a B&VI visitor. A botanic garden cannot implement features to enhance the experience of B&VI visitors based on assumptions. Because there is no one audience of B&VI individuals each organization must determine who is the audience they are serving and then implement

features accordingly. As shown in this research, it may not be wise for an institution to rely on advice given by organizations of and for the blind. While they may know what they majority of B&VI persons feel, they do not represent everyone. That is why an institution must determine who their specific B&VI visitors are.

After a demographical survey has been completed and it has been determined that there are B&VI visitors to the institution and focus group can be studied. This type of study was performed in the Brookfield Zoo study and gave the zoo an idea of what their population of B&VI visitors would find most helpful at their institution.

Implement Audio Stimulating Features

Implement audio stimulating features. After a botanic garden has determined their B&VI visiting population an audio stimulating feature should be implemented. The B&VI respondents in this research overwhelmingly preferred audio stimulating features. The top three choices of the B&VI respondents were motion-triggered talking signs, tape-recorded tours, and tour guides. All of the B&VI respondents replied that it is important for botanic gardens to encourage the use of all of the senses. Audio stimulation should be used in conjunction with the use of all of the senses as an instructional or informative tool. It should not be used as the only tool for B&VI visitors. A botanic garden administrator should not forget that some people considered blind still have the ability to see colors and most can still smell, taste and hear.

These most desired features of the B&VI might not be the best decisions for the institutions. The following is a list, in order of feasibility for most botanic

gardens, of features that could be implemented in botanic gardens based on cost and ease of installation or implementation.

Tape-recorded Tours

Tape-recorded tours can be readily implemented in botanic gardens as the technology is widely used in museums. This technology is easily updateable and useful to all visitors to botanic gardens. Tape-recorded tours would be best used as a non-sequential tour with textured markers along the walkway indicating the next stop along the path. An organization that offers information regarding tape-recorded information is Recording for the Blind and Dyslexic. Acoustiguide Corporation and Antenna Audio Tours create tape-recorded tours for museums. A list of companies that provide audio tours for museums can be found in Appendix E, page 86.

Tour Guides

Use tour guides. Tour guides are probably already on staff and if not current staff could be trained to act as tour guides with a few classes on etiquette and how to guide a person who is blind or visually impaired. Tour guides could prove to be a useful tool at any institution for enhancing the experience of B&VI visitors as well as any visitor to the institution. Botanic gardens today are using tour guides regularly for many types of groups. This is an easy and affordable way to accommodate the B&VI visitor if an institution already has tour guides on staff. If an institution does not already have tour guides this could prove to be a costly means of presenting information to B&VI visitors, as labor is the most costly and limited of any resource in an organization.

Talking Signs

This technology is a combination of tape-recorded tour and the motion triggered talking sign. This technology can be used for signage in the botanic gardens

as well as for finding such facilities such as restrooms and stairways. The transmitters could also be installed on all signs along the walkways to indicate where the path goes and what interesting features are along this path. Talking Sign ® information can be found in Appendix E page 86.

Allow Plant Handling

Allow plant handling. All institutions should develop a plant handling policy and state it clearly on all literature produced by the organization as well as on signs when entering the garden and on all tape-recorded material. Tour guides should also be made aware of the policy and should inform their groups of the policy.

Specific plants in every section of the garden could be designated as 'learning plants' to be handled gently by any visitor to the botanic garden. If there are plants that may cause a threat to the visitor or to which the visitor may cause harm, they should be labeled and the visitors should be made aware of the danger.

If it is not possible to allow people to touch the plant material due to fragility or effect on human skin, Brookfield Zoo's suggestion of a three-dimensional model could be implemented (Jannings 1996).

Implement Layered Signage

Layered signage may be a solution in botanic garden. Layered signage simply means incorporating many types of signage into one location. For example, at one location there would be large, raised-print signage with Braille underneath and perhaps a button to press that causes the sign to talk. This makes the signage accessible to visitors with many types of visual impairments as well as accessible to all visitors to the botanic garden.

The literature at botanic gardens should also be offered in a variety of formats. There should be large print and Braille brochures available as well as all literature on tape. Information regarding companies that create Braille and raised-letter signage can be found in Appendix E, page 86, under the heading “ADA Accessible Signage”.

Explore Funding Possibilities

Botanic garden staff should explore funding possibilities when determining what will be implemented at the institution. Many institutions based their choices for features they would implement of have implemented in their gardens based on cost. The implementation of these features has the potential of being an expensive endeavor. There are many foundations and organizations that will provide funds to institutions that are trying to create a more accessible environment for people who are blind or visually impaired. Any organization considering making their institution more enjoyable to the B&VI visitor should contact the organizations listed in Appendix E, page 86, under the heading “Funding Sources”.

Those organizations listed in Appendix E are not the only organizations that provide these services. They are a short list provided by the researcher to aide a botanic garden in its search to enhance the experiences of their B&VI visitors. Inclusion in the Appendix is not a recommendation by the researcher or a statement of the organizations quality of product or service. A good source of information regarding these recommendations is the World Wide Web.

Other Recommendations

These recommendations are based on observations made while at the field trip sites.

Removal of Hazards

A walkthrough of the institution should be performed to determine potential hazards not only to B&VI visitors but also to any visitor to the garden. Do not install features for the B&VI visitors and then have barriers such as low tree branches in the way of getting to that feature. Do not install way-finding markers along your pathways and have sharp rocks protruding into this walkway. This walkthrough should preferably be performed with a blind or visually impaired individual to gain insight into how they experience an area and what they will need in the area. This is better than guessing that a feature a botanic garden has installed is suitable and will in fact enhance the experience of a blind or visually impaired visitor. The ADAAG states "In general, objects protruding from walls shall protrude no more than 4 inches into walls, halls, corridors, passageways or aisles when their leading edges are between 27 inches and 80 inches above the finished floor. A minimum clear headroom of 80 inches is required in walls, halls, corridors, passageways, aisles, or other circulation spaces. If vertical clearance of an area adjoining an accessible route is reduced to less than 80 inches, a barrier to warn blind or visually impaired people shall be provided. (The Lighthouse, Inc 1994) Even if the area in question at a botanic garden does not legally have to comply with the ADA standards because of the nature of the space, it would be beneficial to take these recommendations and requirements into account when designing a space for the blind or visually impaired visitor.

Conduct Additional Research

Further research needs to be done regarding this topic. The proceeding recommendations for botanic gardens to enhance the experience of B&VI visitors are based on surveys conducted in a small region of the country. The sample size for this research was small due to the nature of the respondents. The B&VI population is a small percentage of the entire population, because of this and privacy issues regarding organizations of and for the blind it was hard to obtain a large base of B&VI persons from which to begin research. Because of the way the B&VI respondents were gathered in this research there is a bias towards B&VI visitors that are interested in horticulture, although a small percentage of them did not exhibit a preference or care for horticulture or visiting botanic gardens in general. It would be beneficial to botanic gardens throughout the country to pursue additional research to determine the thoughts and opinions of B&VI individuals in other regions of the country. However, many of the statistics determined in this research, such as the demographic percentages of the B&VI respondents, coincided with the national statistics found during the research and shows that this research may have relevancy to botanic gardens nation wide.

Another option for further research is for botanic gardens to conduct focus groups similar to those that Brookfield Zoo conducted. Offer B&VI individuals a chance to actually walk through the institution and tell botanic garden administrators what is and is not desirable, what the institution could add and what is useless. There is no better way to make sure money is well spent than by asking the user if it works.

Although this researcher did not directly consider Universal Design Principles in this research, it is possible future researchers should consider doing so. They are listed in Appendix F page 101.

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Appendix A
SURVEY INSTRUMENTS

Survey Administered to Blind and Visually Impaired Individuals

Hello, my name is Kathleen Salisbury. I am a Longwood Graduate Fellow at the University of Delaware pursuing a Master of Science Degree in Public Horticulture. You have contacted me personally or through another individual or organization and expressed interest in completing a survey as part of my research. The topic I have chosen is enhancing the B&VI visitor's experience to botanic gardens. I am hoping you will take twenty minutes of your time to answer the following 20 questions for me. I assure you all information given to me will be kept confidential. The reason for this survey is to get an idea of persons with visual impairments opinions about public gardens and to learn how visually impaired individuals experience a public garden. I am curious to learn what attracts you to such places and what remains in your memory if or when you visit. I am also trying to find out what, if anything, needs to be done at botanic gardens to help you enjoy their institutions. I thank you for taking the time to complete this survey and look forward to learning from your results.

1. Do you visit public gardens or arboreta? Yes No
(If yes proceed to 2, if no go to 5)

2. What is the frequency of your visits?

- a. More than six times a year
- b. Six times a year
- c. Three times a year
- d. Once a year
- e. Other Please Explain _____

3. What season do you visit the gardens?

- a. Spring
- b. Summer
- c. Autumn
- d. Winter

4. Please explain what about each season draws you to the gardens:

5. If no, what are the reasons you have for not visiting the gardens?

(You may check more than one)

- a. Distance
- b. Lack of public transportation
- c. Inadequate facilities (meaning the garden is not conducive to the B&VI visitor)
- d. Never had the opportunity
- e. Do not have an interest in gardens
- f. Other Please explain _____

6. What could a public garden do to enhance your experience at their facility?

7. Which of the following would enhance your experience at a public garden?

- a. Raised line maps
- b. Textured models of the gardens
- c. Textured walkways

Survey Administered to Botanic Gardens

Dear Garden Director or Visitor Education Specialist,

Hello, I am Kathleen Salisbury, a Longwood Graduate Fellow working towards a Master of Science Degree in Public Horticulture from the University of Delaware. I am currently researching my thesis topic "Recommendations to Botanic Gardens on Enhancing the Visually Impaired Visitor's Experience". Your responses to the enclosed survey will help me compare the views of botanic gardens to those of visually impaired persons, and make recommendations based on such comparisons. This survey should not take more than 30 minutes to fill out. Your responses are important to me and I thank you in advance for your time and cooperation in this study. Please return this survey in the enclosed self-addressed stamped envelope provided by **August 30, 1999**.

Thank you once again.

Sincerely,

Kathleen V Salisbury
Longwood Graduate Fellow
University of Delaware
126 Townsend Hall
Newark, DE 19717
302-831-2517

Please take time to fill out the following survey and return using the self addressed stamped envelope provided by August 30, 1999. Thank you.

1. A. Do you have a garden open to the public? Yes No
If yes please proceed if no please return the survey

B. Are you a 501 (c)(3), non-profit institution? Yes No

C. Are you a public or private institution? Public Private

2. A. How do you think botanic gardens, in general, are addressing the visually impaired visitor?

Please circle one of the following:

Excellent Good Fair Poor No Opinion

B. Do you think there is a need for botanic gardens to address the visually impaired visitor?

Please circle one of the following:

Yes No No Opinion

3. Please explain

4. What are the limitations, if any, of your institution in including facilities to enhance the visually impaired visitor's experience? *You may check all that apply*

Unsure of available resources/funds

Lack of funding

Unsure of adequate materials

Unsure of needs of visually impaired individuals

See no need to address any one specific group

Other Please Explain _____

5. Does your institution have features designed specifically to enhance a visually impaired visitor's experience by stimulating the other four senses?

Yes No Unsure

If yes go to 6, if no go to 8

6. If yes, what types of features do you have?

Please check all that apply

- Fragrance Garden
- Garden for the Blind
- Sensory Garden
- Braille Signage
- Raised letter signage
- Large Print signage
- Motion triggered talking signs
- Tour guides
- Self-guided audio tours
- Raised line/Letter signage
- Handrails/Textured Walkways
- Water Features
- Other Please Explain _____

7. Why have you chosen to implement these features?

8. If no, which of the following would you most likely use and why, provided you had the resources to do so?

- Fragrance Garden
- Garden for the Blind
- Sensory Garden
- Braille Signage
- Raised letter signage
- Large Print signage
- Motion triggered talking signs
- Tour guides
- Self-guided audio tours
- Raised line/Letter signage
- Handrails/Textured Walkways
- Water Features
- Other Please Explain _____

9. Why would you choose the features you have selected?

10. Does your institution have a policy or philosophy regarding the handling of plant material by a visitor? Yes No

If yes go to 11, if no go to 12

11. If yes, what is that policy or philosophy?

12. Has your institution administered demographical surveys? Yes No

If yes go to 13, if no go to 16

13. If yes, did you find that you have blind or visually impaired visitors to your garden?

Yes No

If yes go to 14, if no go to 16

14. If yes, what was the percentage of blind or visually impaired visitors to your gardens? _____%

15. What were the visually impaired respondents' reactions to your facility?

Please circle one of the following:

Excellent Good Fair Poor None responded/Question Not Asked

16. Would your institution be interested in the results of a survey determining the interest of the B&VI community in botanic gardens and horticulture in general?

Yes No No Opinion

Thank you for taking the time to complete this survey. I look forward to learning from your responses.

Appendix B

HUMAN SUBJECTS REVIEW BOARD EXEMPTION

Appendix C

**AABGA MEMBERS IN THE STATES OF DELAWARE, DISTRICT OF
COLUMBIA, MARYLAND, NEW JERSEY, NEW YORK, PENNSYLVANIA,
AND VIRGINIA**

Delaware

Delaware Center for Horticulture

Longwood Graduate Program

Mt. Cuba Center

University of Delaware Botanic Gardens

District of Columbia

Dumbarton Oaks

Hillwood Museum and Gardens

Smithsonian Institution

U.S. Botanic Garden

United States National Arboretum

The Washington National Cathedral

Maryland

The Adkins Arboretum

The Baltimore Conservatory Association, Inc.

Brookside Gardens

Ladew Topiary Gardens

Salisbury State University Arboretum

Surreybrooke

William Paca Garden

New Jersey

Camden City Garden Club

Frelinghuysen Arboretum

Mary Grace Burns Arboretum

Medford Leas

Monmouth County Shade Tree Commission

Reeves-Read Arboretum

Rutgers Gardens

Skylands Association

Van Vleck House and Gardens

New York

Abigail Adams Smith Museum and Gardens

American Society of Botanical Artists

Battery Park City Parks Corporation

Bayard Cutting Arboretum

Brooklyn Botanic Garden

Buffalo and Erie County Botanical Garden Society

Cobleskill College, SUNY

Cornell Plantations

Genesee Country Village and Museum

George Eastman House

George Landis Arboretum

Glass Garden, Ruck Institute of Rehabilitation Medicine

Highland Botanical Park

Hofstra University Arboretum,

The Horticultural Society of New York

Howard Phipps Estate

Long House Reserve

The Madoo Conservatory

The New York Botanical Garden

Oceanside School Six Memorial Botanical Garden and Arboretum
Oneida Community Mansion House
PepsiCo's Donald M. Kendall Sculpture Gardens
Planting Fields Arboretum State Historic Park
Queens Botanic Garden Society, Inc.
Scenic Hudson, Inc.
State University of New York
Staten Island Botanic Garden
Stonecrop Gardens
Wave Hill
Yonkers Parks, Recreation and Conservation

Pennsylvania

Aramark Conference Center
Awbury Arboretum and Historic Site
Bowman's Hill wildflower Preserve
Brandywine Conservancy
Bryn Mawr College
Cedar Crest College
Chanticleer
Chatham College Arboretum
Crozer Arboretum
East Stroudsburg University
Elizabethtown College
Erie Zoological Society
Friends Hospital

Graver Arboretum of Muhlenberg College
Harrisburg Area Community College
Haverford College Arboretum
Henry Foundation for Botanical Research
Henry Schmeider Arboretum of Delaware Valley College
Hershey Gardens
Historic Bartram's Gardens
Horticultural Society of Western Pennsylvania
The Horticulture Center
Jenkins Arboretum
Longwood Gardens, Inc.
Louise Arnold Tanger Arboretum
Marywood University Arboretum
Masonic Homes
Morris Arboretum of the University of Pennsylvania
Phipps Conservatory and Botanical Gardens, Inc.
The Pittsburgh Civic Garden Center
Pittsburgh Zoo
Rodef Shalom Biblical Botanical Garden
Scott Arboretum of Swathmore College
Taylor Memorial Arboretum
Temple University
Tyler Arboretum
Villanova University
Welkinweir

Windrose Nursery

Zoological Society of Philadelphia

Virginia

Boxerwood Gardens

Forest Lawn Cemetery and Arboretum

Green Spring Gardens Park

James Madison University Arboretum

Lewis Ginter Botanical Garden

Monticello

Montpelier

Norfolk Botanical Garden

Orland E. White Arboretum

Stratford Hall Plantation

Sweet Briar College

Virginia Tech Horticulture Garden

The Winkler Botanical Preserve

Appendix D

**A LIST OF ORGANIZATIONS OF AND FOR THE BLIND CONTACTED
DURING THE COURSE OF RESEARCH**

The Lighthouse Information and Resource Services
111 East 59th Street, 11th Floor
New York, New York 10022

Lighthouse Consumer Products
111 East 59th Street, 12th Floor
New York, New York 10022

The National Eye Institute
31 Center Drive MSC 2510
Building 31, Room 6A32
Bethesda, MD 20892

American Foundation for the Blind
Suite #300
11 Penn Plaza
New York, New York 10001

Braille Institute of America
741 North Vermont Avenue
Los Angeles, CA 90029

National Association for the Visually Handicapped
6th Floor
22 West 21st Street
New York, New York 10010

Prevent Blindness America
500 East Remington Road
Schaumburg, IL 60140

Foundation Fighting Blindness
Executive Plaza 1, Suite 800
11350 McCormick Road
Hunt Valley, MD 21031

National Federation of the Blind
1800 Johnson Street
Baltimore, MD 21230

American Council of the Blind
American Council of the Blind
1155 15th Street, NW, Suite 1004
Washington, DC 20005

Recordings for Blind and Dyslexic, Inc.
National Headquarters
20 Roszel Rd.,
Princeton, NJ 08540

The Jewish Braille Institute of America
110 East 30th Street
New York, NY 10016

Smith-Kettlewell Eye Research Foundation
Rehabilitation Engineering Center
2232 Webster Street
San Francisco, California 94115

Appendix E
SOURCES

ADA Accessible Signage

C&M signs

Williamsport, Pa 17702
Phone: (570) 322-2198
Fax: (570) 321-1910
E Mail: info@cmsigns.com

The Alphabet Shop Inc.

300 East Elgin Avenue, Elgin, IL 60120
Phone: (847) 888-3150
Fax: (847) 888-5588
Web Address: <http://www.alphabetshop.com/>

ASI Sign Systems, Inc.

3890 W. Northwest Highway Dallas, TX 75220
Phone: (214) 352-9140
Toll Free: 1-800-ASI-SPEC
Fax: (214) 352-9741
E-mail: corporate@asisign.com
Web Address: <http://www.asisign.com/>

Baron Sign Manufacturing

1009 Newman Road West Palm Beach, Florida 33403
Toll Free: 1-800-531-9558
Fax: 561-848-2270
E-Mail: info@baronsign.com
Web Address: <http://www.baronsign.com/>

Entrada Braille

8202 Brooklyn Boulevard Minneapolis, MN 55445
Phone: (612) 425-4459
Fax: (612) 425-5166
Web Address: <http://www.elevatorbraille.com/>

H. Toji & Company

Phone: (310) 323-5210
Web Address: [http://home.earthlink.net/~accesscomm/#Co. 1](http://home.earthlink.net/~accesscomm/#Co.1)

Hackley Display Company

2996 Teagarden Street San Leandro, CA. 94577

Phone: (510) 895-6553

Fax: (510) 895-5640

Web Address: <http://www.hackleydisplay.com/>

Media Incorporated

19428 66th Ave South Suite Q-104 Kent, WA 98032-2123

Phone: (425) 251-5145

Toll Free: 1-800 259-9388

Fax: (425) 251-5233

Email: info@media-ada.com

Web Address: <http://www.media-ada.com/>

Mohawk Sign Systems

P.O. Box 966 Schenectady, NY 12301

Phone: (518) 370-3433

Fax: (518) 370-3332

Email: tom@mohawksign.com

Web Address: <http://mohawksign.com/>

Morrison Architectural Sign Co., Inc.

3108 Garden Brook Drive Dallas, TX 75234

Phone: (972) 247-7160

Toll Free: 800-444-3613

Fax: (972) 247-7169

Web Address: <http://www.morrisonsign.com/>

Precision Engraving

722 Industry Drive Seattle, WA 98188

Phone: (206) 575-4544

Toll Free: 1-800-299-3824

Fax: (206) 575-8081

Email: grant54@PROETCH.COM

Web Address: www.ProEtch.com

SCOTT Sign Systems, Inc. ®

P. O. Box 1047 Tallevast, FL 34270-1047

Toll Free: 1-800.237.9447

Phone: (941) 355-5171

Fax: (941) 351-1787

Web Address: <http://www.scottsigns.com/>

Signs Now ®

1537 Fort Campbell Blvd. Clarksville, Tennessee 37042

Phone: (931) 503-3030

Email: Signsnow@clarksville.com

Web Address: <http://www.clarksville.com/signsnow/>

North West Builders Network

Po Box 11306 Eugene, OR 97440

Phone: (541) 895-5061

Web Address: www.nwbuildnet.com

Lettering Specialists, Inc

PO Box 3410 Skokie, IL 60076

Phone: (847) 674-3414

Fax: (847) 674-9571

Email: signinfo@lsi-signs.com

Web Address: www.lsi-signs.com

The Southwell Co.

PO Box 299 San Antonio, TX 78291-0299

Phone: (210) 223-1831

Toll Free: 1-800-950-8068

Fax: (210) 223-8517

Web Address: www.southwellco.com

The Badge Boys

23764 Montecarlo Place NW Paulsbo, WA 98370

Toll Free: 1-(888)-755-2444

Fax: (360) 697-6295

Email: info@thebadgeboys.com

Web Address: <http://thebadgeboys.com/>

The Casper Co.

P.O. Box 341818, Memphis, TN 38184

Phone: (901) 372-1419

Toll Free: 1-877-649-6694

Fax: (901) 388-0395

Web Address: <http://www.casperco.com/>

Lake Shore Industries

1817 Poplar Street P.O. Box 59 Erie PA 16512
Toll Free: 800-458-0463
Fax: (814) 453-4293
E-Mail: info@lsisigns.com

Lustre Products Ltd.

28320 58th. Ave. Abbotsford, British Columbia Canada, V4X 2E8
Phone: (604) 856-9196
Fax: (604) 856-7752
E Mail: sales@lustreproducts.com
Web Address: <http://www.lustreproducts.com/>

Best Mfg. Co.

P.O. Box 577 Montrose, CO 81402-0577
Phone: (970) 249-2378
Toll Free: 1-800-235-2378
Fax: (970) 249-0223
Email: sales@bestsigns.com
Web Address: <http://www.bestsigns.com/>

A Sign of The Times

13165 E. 5th Ave. Aurora, CO 80011-8501
Phone: (303) 343-0275
Fax : (303) 344-2869
Web Address: <http://members.aol.com/dnelson789/index.html>

E.R. Perry, Signs and Engraving

P.O. Box 487 Arrowhead Bldg, Grand Marais, MN 55604
Phone: (218) 387-9479
Fax: (218) 387-9794
Email: signs@erperry.com
Web Address: <http://www.erperry.com>

FFI Group,

109 Locust Hill Rd. PO Box 259 Belton, MO 64012-0259
Phone: (816) 322-2580
Toll free: 1-888-334-5839
Fax: (816) 322-0478
Web Address: <http://ffigroup.com/>

National Visual Systems, Inc.

5482-G Oceanus Drive Huntington Beach CA 92649

Tel: (714) 891-2670

Toll Free: 1-800-788-2670

Fax: (714) 898-9034

E-Mail: signs@nationalvisual.com

Web Address: <http://www.nationalvisual.com/>

Acme Products Inc.

2241 NW 22nd St. Pompano Beach FL 33069

Toll Free: 1-800-255-2141

Fax: 1-800-467-2263

Web Address: <http://www.acmeproductsinc.com>

Bell Company, Inc.

106 Morrow Ave. P.O. Box 92 Trussville, AL 35173-0092

Phone: (205) 655-2135

Toll Free: 1-800-828-3564

Fax: 1-205-655-2138

Web Address: <http://www.bellcoinc.com/>

Duxbury Systems, Inc.

270 Littleton Rd., Unit 6, Westford, MA 01886-3523 USA

Phone: (978) 692-3000

Fax: (978) 692-7912

Email: info@duxsys.com

Web Address: <http://www.duxburysystems.com/>

Sign/text, Inc.

31655 West Eight Mile Road Livonia, MI 48152

Phone: (810) 442-9080

Toll Free: 1-800-919-7774

Fax: (810) 442-8536

Web Address: <http://www.signtext.com/>

Talking Signs, Inc.

812 North Boulevard Baton Rouge, LA 70802

Toll Free: 1-888-825-5746

Fax: (504) 344-2811

Email: info@talkingsigns.com

Web Address: <http://www.talkingsigns.com/index.shtml>

Audio Tours

Acoustiguide Corporation

1301 Ave. of the Americas New York, NY 10019

Phone: (212) 974-6600

Fax: (212) 974-6607

Antenna Audio Tours

P.O. Box 176 Sausalito, CA 94966

Phone: (415) 332-4862, x114

Fax: (415) 332-4870

Email: ctellis@antenna-audio.com

Web Address: <http://www.antenna-audio.com>

Communication Arts Multimedia, Inc.

2013 Wells Branch Pkwy., #201 Austin, TX 78728

Phone: (512) 251-0074

Fax: (512) 251-0087

Email: mail@commartsmultimedia.com

Web Address: <http://www.commartsmultimedia.com/multi.htm>

Visible Interactive

1901 Pennsylvania Ave. N.W. Washington, DC 20006

Phone: (202) 822-6400

Fax: (202) 822-6403

Thwaite Productions Ltd.

442 Old Las Vegas Highway Santa Fe NM 87505 US

Phone: (505) 820-6744

Fax: (505) 982-7674

Vista Group International

17 Washington Street Norwalk CT 06854

Phone: (203) 852-5557

Fax: (203) 852-5559

Email: vistagroup@discovernet.net

Brown Innovations, Inc.

935 West Chestnut Suite 520 Chicago IL 60622 US

Phone: (312) 491-8400

Fax: (312) 491-8401

Email: biivai@purestereo.com

Web Address: <http://www.purestereo.com/indexc.html>

Southwest Museum Services

8100 Blackenship Drive Houston TX 77055

Phone: (713) 722-8293

Fax: (713) 722-8296

Email: swmuseum@swmuseum.com

Web Address: <http://www.swmuseum.com/>

Stop and Listen, Inc.

3928 Edmonton Tr /VE Calgary AB T2E 3P6 Canada

Toll Free: 1-800-387-2365

Web Address: <http://www.stoplisten.com/>

Tour Mate Systems

35 Barclay Road Toronto Ontario M3H 3E2 Canada

Phone: (416) 636-5654

Fax: (416) 633-4985

Email: info@tourmate.com

Web Address: <http://www.tourmate.com/>

Funding Sources

MAJOR MUSEUM FUNDING ORGANIZATIONS:

Institute of Museum and Library Services

Office of the Director

1100 Pennsylvania Avenue, NW Room 510 Washington, DC 20506

Phone: (202) 606-8536

Fax: (202) 606-8591

Email: imlsinfo@imls.gov

Web Address: www.imls.gov

National Endowment for the Arts

1100 Pennsylvania Avenue NW Washington, DC 20506

Phone: (202) 682-5400

Email: webmgr@arts.endow.gov

Web Address: <http://arts.endow.gov/>

National Endowment for the Humanities

1100 Pennsylvania Ave, NW Washington DC 20506

Phone: (202) 606-8400

Email: info@neh.gov

Web Address: <http://www.neh.gov/>

National Historical Publications and Records Commission (NHPRC)

National Archives and Records Administration

700 Pennsylvania Avenue, NW, Room 111 Washington, DC 20408-0001

Phone: (202) 501-5610

Fax: (202) 501-5601

Web Address: <http://www.nara.gov/nhprc/#contact>

National Science Foundation

4201 Wilson Boulevard Arlington, Virginia 22230, USA

Phone: (703) 306-1234

Toll Free: 1-800-877-8339

TDD: (703) 306-0090

Telecommunications Information Infrastructure Application Program
Technology Opportunities Program
Office of Telecommunications and Information Applications
National Telecommunications and Information Administration
U.S. Department of Commerce
1401 Constitution Avenue, NW Room 4092 Washington, DC 20230
Web Address: <http://www.ntia.doc.gov/otiahome/top/whoweare/whoweare.htm>

Initiative Foundation

405 First Street Southeast, Little Falls, MN 56345
Phone: (320) 632-9255
Fax: (320) 632-9258
Email: info@ifound.org

The Charles A. and Anne Morrow Lindbergh Foundation

2150 Third Avenue North, Suite 310 Anoka, MN 55303-2200
Phone: (612) 576-1596
Fax: (612) 576-1664
E-mail: lindbergh@isd.net
Web Address: <http://www.lindberghfoundation.org>

The Northland Foundation (Minnesota Only)

202 West Superior Street, Suite 610 Duluth, Minnesota 55802
Phone: (218) 723-4040
Toll Free: 1-800-433-4045
Fax: (218) 723-4048

ACCESSIBILITY FUNDING:

US Department of Housing and Urban Development

451 7th Street SW Washington, DC 20410

Phone: (202) 401-0388

TTY: (202) 708-1455

NEC Foundation of America

Sylvia Clark, Executive Director

8 Corporate Center Drive Melville, NY 11747-3112

Phone: (516) 753-7021

TTY: (516) 753-7904

Fax: (516) 753-7096

E-mail: reidenbb@ccgate.ml.nec.com

Web Address: <http://www.nec.com/company/foundation/found1.html>

Mitsubishi Electric America Foundation

1560 Wilson Blvd. Suite 1150 Arlington, VA 22209

Phone: (703) 276-8240

Fax: (703) 276-8260

Web Address: <http://www.meaf.org/about.html>

W.K. Kellogg Foundation

One Michigan Avenue Battle Creek, Michigan 49017-4058

Phone: (616) 968-1611

Web Address: <http://www.wkkf.org/>

AAM

1575 Eye Street NW Suite 400 Washington DC 20005

Phone: (202) 289-1818

Fax: (202) 289-6578

Web Address: www.aam-us.org

RESOURCES FOR FUNDING:

The Chronicle of Philanthropy

editor@philanthropy.com

<http://philanthropy.com/>

Americans With Disabilities Act Technical Assistance Program

Mid-Atlantic DBTAC

TransCen, Inc.

451 Hungerford Drive, Suite 607 Rockville, MD 20850

Phone: (301) 217-0124 (V/TTY)

Fax: (301) 217-0754

Email: adainfo@transcen.org.

Web Address: <http://www.adainfo.org>.

National Institute on Assistive Technology Program,

Office of Special Education and Rehabilitative Services,

Department of Education,

400 Maryland Ave., SW., Washington, DC 20202.

Phone: (202) 205-5666

Web Address: <http://www.ed.gov/>

National Council on Disability

1331 F St., NW, Suite 1050 Washington, DC 20004-1107

Voice: (202) 272-2004

FAX: (202) 272-2022

TTY: (202) 272-2074

E-mail: mquigley@ncd.gov

Web Address: <http://www.ncd.gov/>

The Foundation Center

79 Fifth Avenue New York, NY 10003

Phone: (212) 620-4230

Fax: (212) 691-1828

Email: feedback@fdncenter.org

Web Address: <http://fdncenter.org/>

National Directory of Corporate Giving

October 1999 / ISBN 0-87954-888-6 / 1,092 pp.

New York: The Foundation Center.

Web Address: http://fdncenter.org/onlib/faqs/corporate_giving.html

Federal Money Retriever

IDI Magic Technologies Corporation

P. O. Box 97655 Las Vegas, NV 89193

Email: info-fmr@idimagic.com

Web Address: <http://www.idimagic.com/htmls/fedspending2.html>

Guide to Federal Funding for Governments and Nonprofits

Government Information Service,

4301 N. Fairfax Drive, Suite 875, Arlington, VA 22203-1627;

Phone: (703) 528-1000

Fax: (703) 528-6060

Directory of Grants for Organizations Serving People with Disabilities

Richard M. Eckstein, ed.

Loxahatchee, Fla.

Research Grant Guides, Inc., 1998. 10th edition. Reference

TEXTURED WALKWAY RESOURCES:

E.P. Henry

201 Park Avenue, PO Box 615 Woodbury, New Jersey 08096

Phone: (856) 845-6200

Toll Free: 1-800-44-HENRY

Fax: (856) 845-0023

Email: info@ephenry.com

Web Address: <http://www.ephenry.com/>

Anchor Block Company

2300 McKnight Road North St. Paul, MN, 55109-2930

Phone: (651) 777-8321

Fax: (651) 777-0169

Web Address: <http://www.anchorblock.com/>

Botanical Decorators

5011B Olney Laytonsville Rd. Olney, MD 20832

Phone: (301) 948-6625

Toll Free: 1- 888-550-6625

Fax: (301) 948-3323

Email: contact@botdec.com

Web Address: <http://www.botdec.com/>

The Arsenal Group

21005 Farmington Rd Suite 104 Farmington Hills, MI 48336

Phone: (248) 471-1144

Fax: (248) 471-1166

Email: questions@Tag4u.com

Web Address: <http://www.Tag4u.com>

A.A. Will Materials Corporation

168 Washington Street Stoughton, MA

Phone: (781) 344-0300

Toll Free: 1-800-4-AAWILL

Fax: (781) 341-0300

Email: aawill@thecia.net

Web Address: <http://www.aawillmaterials.com/index.html>

Pave Tech Inc.

PO Box 576 Prior Lake, MN 55372

Phone: (612) 226-6400

Toll Free: 1-800-728-3832

Fax: (612) 226-6406

Email: sales@pavetech.com

Web Address: <http://www.pavetech.com>

Woodbury Cement Products

630 S. Evergreen Ave Woodbury, NJ 08097

Toll Free: 1-800-325-7383

Fax: (856) 853-5830

Email: tony@woodburycement.com

Web Address: http://www.woodburycement.com/cultured_stone.htm

Appendix F
UNIVERSAL DESIGN PRINCIPLES

A working group of architects, product designers, engineers and environmental design researchers, collaborated to establish the following Principles of Universal Design to guide a wide range of design disciplines including environments, products, and communications. These seven principles may be applied to evaluate existing designs, guide the design process and educate both designers and consumers about the characteristics of more usable products and environments. More information regarding Universal Design can be found at the following website:
http://www.design.ncsu.edu/cud/univ_design/princ_overview.htm.

The seven principles of Universal Design are:

1. **Equitable Use:** The design is useful and marketable to people with diverse abilities.

Guidelines:

- Provide the same means of use for all users: identical whenever possible; equivalent when not.
- Avoid segregating or stigmatizing any users.
- Provisions for privacy, security, and safety should be equally available for all users.
- Make the design appealing to all users.

2. **Flexibility in Use:** The design accommodates a wide range of individual preferences and abilities.

Guidelines:

- Provide choice in methods of use.
- Accommodate right- or left-handed access and use.

- Facilitate the user's accuracy and precision.
 - Provide adaptability to the user's pace.
3. **Simple and Intuitive:** Use of the design is easy to understand, regardless of the user's experience, knowledge, language skills, or current concentration level.

Guidelines:

- Eliminate unnecessary complexity.
 - Be consistent with user expectations and intuition.
 - Accommodate a wide range of literacy and language skills.
 - Arrange information consistent with its importance.
 - Provide effective prompting and feedback during and after task completion.
4. **Perceptible Information:** The design communicates necessary information effectively to the user, regardless of ambient conditions or the user's sensory abilities.

Guidelines:

- Use different modes (pictorial, verbal, tactile) for redundant presentation of essential information.
- Provide adequate contrast between essential information and its surroundings.
- Maximize "legibility" of essential information.

- Differentiate elements in ways that can be described (i.e., make it easy to give instructions or directions).
- Provide compatibility with a variety of techniques or devices used by people with sensory limitations.

5. **Tolerance for Error:** The design minimizes hazards and the adverse consequences of accidental or unintentional actions.

Guidelines:

- Arrange elements to minimize hazards and errors: most used elements, most accessible; hazardous elements, isolated or shielded.
- Provide warnings of hazards and errors.
- Provide fail-safe features.
- Discourage unconscious action in tasks that require vigilance.

6. **Low Physical Effort:** The design can be used efficiently and comfortably and with a minimum of fatigue.

Guidelines:

- Allow user to maintain a neutral body position.
- Use reasonable operating forces.
- Minimize repetitive actions.
- Minimize sustained physical effort.

7. **Size and Space for Approach and Use:** Appropriate size and space is provided for approach, reach, manipulation, and use regardless of user's body size, posture or mobility.

Guidelines:

- Provide a clear line of sight to important elements for any seated or standing user.
- Make reach to all components comfortable for any seated or standing user.
- Accommodate variations in hand and grip size.
- Provide adequate space for the use of assistive devices or personal assistance (Connell 1997).

GLOSSARY

Americans with Disabilities Act – A federal act signed into law on July 26, 1990 that provides civil rights protection to people with disabilities.

Blind – Having a maximal visual acuity of the better eye, after correction by refractive lenses, of one-tenth normal vision or less (20/200 or less on the Snellen test). Blindness encompasses a narrower population than legally blind or visually impaired.

Braille – A system of printing or writing for the blind or visually impaired in which the characters are represented by tangible points or dots. It was invented by Louis Braille, a French teacher of the blind.

Braille Signage – Interpretive or directional signage using Braille.

Fragrance Garden – An area in the garden containing a concentration of plants chosen specifically for distinctive fragrances.

Garden for the Blind - A themed garden within a larger public garden designated as “for the blind” by the institution. Typically it contains Braille signage and fragrant and texturally interesting plants.

Guide Dog – A dog that has been specifically trained to guide a blind or visually impaired person.

Legally Blind – Both eyes have a visual acuity of 20/200 or worse according to a standard Snellen chart examination. This term is primarily used for legal and official purposes. This term encompasses a broader population than blindness but a narrower population than visually impaired.

Low Vision – The level of best-corrected visual acuity at which a person is said to have “low vision” has several definitions. Measured levels of 20/60 or 20/70 are commonly used and correspond roughly to the more qualitative definition of inability to read regular newsprint.

Motion-triggered Talking Signs – Directional signage that speaks when a sensor is triggered by a visitor.

Private Garden – A garden funded by private organizations.

Public Garden – 1. Used interchangeably throughout paper with institution and botanic garden and simply meaning an institution with a garden open to the public.

2. A botanic garden funded by public organizations such as county, state, or federal organizations.

Raised Letter Signage – Directional and interpretive signage that has its wording raised in order to be read tactilely by B&VI visitors.

Raised Line Signage – Typically directional signage showing pathways and access points throughout the garden.

Sensory Garden – A themed garden within a larger garden including plants because they stimulate the senses. Typically these gardens contain plants with strong fragrances, unique textures, and sounds.

Severely Visually Impaired - A term applied to the approximately three-quarters of those considered blind that have some useful vision, typically means a person cannot read newsprint.

Tape-Recorded Tours – A garden tour highlighting specific areas, recorded on audiotape to be listened to headphones by visitors.

Textured Walkways – Pavement changes throughout the gardens used to indicate change in section, interest, or features such as steps and turns in the walkway.

Tour Guides – A person hired or a volunteer for the organization to guide groups or individuals around the garden. The guides adjust the tour to compliment the specific group or individual visiting.

Universal Design – The design of products and environments to be useable by all people, to the greatest extent possible, without need for adaptation or specialized design.

Visually Impaired – Having a visual acuity of less than 20/40 in the better eye even with glasses.

Water Features – Structures in a garden such as fountains and pools that incorporate the sounds, feels and sights of water.

White Cane – Colored white with a red tip, the cane allows the user to check the immediate surface for obstacles. The cane is held in front of the body and moved from side to side to check the ground in front of the user. Drivers and other pedestrians are made aware that the person with the cane may be unable to see objects or other people.