

# **EDUCATIONAL PLACEMENT OPTIONS FOR BLIND AND VISUALLY IMPAIRED STUDENTS:**

**A Literature Review**

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# INTRODUCTION

Washington State University's Social and Economic Sciences Research Center (WSU-SESRC) was contracted by WSIPP to conduct a literature review on educational placements of blind and visually impaired (BVI) children.

Research questions included the following:

- 1) Educational Settings: Laws, History, and Current Options**
  - a. Laws and Policies: Which national and state laws and policies affect the education of the blind and visually impaired? How have they changed over time?
  - b. History: What historical factors influenced the development of the current spectrum of educational settings for BVI students?
  - c. Current Educational Placement Options: What are the current educational placement options for BVI students?
- 2) BVI Students: Unique Developmental Challenges and Educational Needs**
  - a. Challenges in Early Childhood Development and the Need for Early Intervention: What are the common developmental challenges faced by BVI infants and young children? How can early intervention address these challenges?
  - b. The Unique Educational Needs of BVI Students: Once BVI children reach school age, what are their unique educational needs?
- 3) The Effectiveness of Different Educational Settings**
  - a. Does the research support one placement type over another?
  - b. What are the advantages and disadvantages of different educational settings?
  - c. What key factors influence the use and effectiveness of different types of placements?
- 4) Technology**
  - a. How are technological developments impacting the education of BVI students?
  - b. Are different types of technology and requisite training and support more or less accessible in different settings?

## **METHODS**

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WSU-SESRC conducted a search of the literature on the education of BVI students in different settings. Relevant articles were found through searching databases of peer reviewed journals, such as ERIC, Expanded Academic ASAP, and Education Full Text through ProQuest, InfoTrac, and eLibrary. Additional searches included the catalogues of the University of Washington library, Washington State University library, Washington State Library, Kitsap Regional Library, King County Library, and the Internet.

Search terms included the following: blind, vision impairment, special school, residential school, educational placement, instructional setting, inclusion, inclusive, mainstream, vision loss, development, early intervention, children, and student, among others.

## EDUCATIONAL SETTINGS: LAWS, HISTORY, AND CURRENT OPTIONS

Educational options for blind and visually impaired (BVI) students have expanded dramatically since the first residential boarding school for the blind opened in 1832. Today, a full spectrum of educational settings is available for BVI students, from attending regular classes in the local school district to living at a residential school.

This chapter reviews national and state laws and policies that support the education of BVI students. It also provides a brief history of the development of the current array of educational options for BVI students and discusses the two most common educational settings: (1) the local school itinerant teacher model, and (2) the residential school/outreach services model.

### NATIONAL AND STATE LAWS AND POLICIES

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This section provides an overview of the laws and policies that have impacted the education of BVI students in United States.

**The Act to Promote the Education of the Blind:** This was the first federal act benefiting blind students. In March 1879, this act established the American Printing House for the Blind (APH). Ten thousand dollars per year was allocated for the printing of embossed books and providing apparatus for blind students throughout the country. In 1946, the act was expanded to include the production of books with large type. In Fiscal Year (FY) 2004, federal appropriations provided for about 60 percent of the organization's budget of \$27,850,000. In that year, APH provided free materials to approximately 57,500 people with visual impairments (FY2005 Budget Summary, 2004 as cited in Taylor, 2005).

**The Pratt-Smoot Act:** Passed in 1931, this act led to the establishment of the National Library Service for the Blind and Physically Handicapped through the Library of Congress. It promoted the production of embossed books for adults and coordinated the circulation of them through local and regional libraries (Taylor, 2005).

**Education for All Handicapped Children Act (also known as PL-142),** reauthorized as the Individuals with Disabilities Education Act: The passage of this act in 1975 led to major changes in the provision of educational services for BVI students. It mandated the provision of free, appropriate education and related services in the least restrictive environment (LRE). The concept of LRE is based on a continuum of educational settings, which places regular classrooms in mainstream schools as the least restrictive option. Each option that takes students further away from the "norm" of the regular classroom is viewed as progressively more restrictive. Residential schools are viewed as very restrictive, second only to hospitals (Henderson, 2001; Masoodi, 2004; Taylor, 2005).

In 1990, the Education for All Handicapped Children Act was reauthorized as the **Individuals with Disabilities Education Act (IDEA)**. This act strengthened the LRE provisions. The IDEA explicitly stated that students should be educated in the regular classroom to the maximum extent possible. Time away from the regular classroom needed to be justified in the student's Individualized Education Plan (IEP) (Masoodi, 2004).

The IDEA was reauthorized in 1997 and again in 2004. Changes in the 2004 act align IDEA with the No Child Left Behind Act. The 2004 reauthorization also included the **Instructional Materials Accessibility Act (IMAA)**, which mandates the provision of educational materials to blind students at the same time that the materials are provided to the sighted students (American Foundation for the Blind website, accessed September 9, 2005; Beadles, 2005). The FY2005 budget for IDEA authorizes an increase of \$1 billion, spending an average of \$1,612 per disabled student for IMAA (Apling & Jones, 2005; FY2005 Budget Summary as cited in Taylor, 2005).

**Section 504 of the Rehabilitation Act of 1973:** This law prohibits discrimination on the basis of disability by any program, public or private, receiving federal funds. It mandates a free, appropriate public education, which should be comparable to the education received by non-disabled students. Under Section 504, students can be educated in regular or special education classrooms. If students need accommodations (such as a specific piece of technology), but they do not need "Specially Designed Instruction," they will have a "504 Plan" instead of an IEP (Snyder, 2005). The law does not provide any specific federal funding; however, it bases the future receipt of federal funds on compliance with the provisions (Henderson, 2001; Richards, 2003).

**The Americans with Disabilities Act (ADA) of 1991:** The ADA protects people with disabilities from discrimination in employment and public services, regardless of whether the facilities receive public funds. In education, it applies to public schools and private, non-sectarian schools (not religious schools). The ADA does not specifically provide for a free, appropriate public education, but it does reinforce the requirements of Section 504 (Henderson, 2001; Katsiyannis & Yell, 2002). The courts have interpreted ADA and Section 504 almost identically (Richards, 2003).

**The National Agenda for the Education of Children and Youths with Visual Impairments, Including Those with Multiple Disabilities:** The National Agenda is a statement of policy goals reflecting input of the education community, parents, and people with visual impairments. It was created through a grassroots effort sponsored by the American Foundation for the Blind.

The National Agenda is based on the following scenario:

IF there is an adequate supply of well-prepared teachers, who benefit from early referrals and from having parents as partners and have manageable case loads; a full array of placement options are available; children's placements are based on quality assessments; instructional materials are

available in the right media at the right time; and a disability-specific core curriculum is implemented for all visually impaired students; THEN educators will have entered the 21st century assured of having the tools to prepare children with visual impairments for a fulfilling and satisfying adult life (Ann, 1996).

**International Policy Statements:** While this literature review focuses on the education of the blind in the United States, the topic of educational settings for BVI students has received much international attention and research. Many international policy statements support inclusive education of BVI students, such as the **International Convention on the Protection and Promotion of the Rights and Dignity of Persons with Disabilities**, which includes a section on “**Flagship on the Right to Education for Persons with Disabilities: Towards Inclusion**” (UNESCO, 2005).

## **A BRIEF HISTORY OF BVI EDUCATION IN THE UNITED STATES**

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Since the early 1800s, the landscape of educational options for BVI students has undergone a major transformation. Historically, residential boarding schools for the blind were the primary source of education for BVI students in the United States, educating 90 to 95 percent of BVI students prior to 1935 (Masoodi, 2004). Residential schools for the blind defined themselves as academic institutions on par with the public schools (Masoodi, 2004).

Currently, the educational landscape has almost completely reversed. In 2003, only 8 percent of BVI students were educated in residential schools (Heward, 2003 as cited in Masoodi, 2004) with the majority of students attending their local schools (DeMott, 1993; Oyinlade & Gellhaus, 2005). The role of the residential school<sup>1</sup> has also shifted considerably, as such schools now serve a population that includes some of the most severely multiply-handicapped children, many of whom focus on learning functional, as opposed to academic, skills.

This section provides a brief history of BVI education in the United States, focusing on the development of these changes in the landscape of educational options for BVI students.

In 1832, Samuel Howe opened the first residential school for the blind in the United States, now known as the Perkins School for the Blind, in Massachusetts. The Perkins School was intended to be a preparatory academy that also taught vocational and life skills to blind students. Education of the blind expanded in subsequent years, and by 1910 most states had established schools for the blind (Erin, 1993; Masoodi, 2004; Taylor, 2005).

In Washington State, specialized education for the BVI students began when the Legislature established the Washington School for Defective Youth in 1885. The school

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<sup>1</sup> Unless otherwise marked, the term “residential schools” refers to “residential schools for the blind” throughout this report.

enrolled deaf, blind, and “feeble-minded” students (Washington Territorial Legislature, p. 136 as cited in Masoodi, 2004). In 1905, separate facilities were established for the “feeble-minded,” and the school became the Washington State School for the Deaf and Blind. This move strengthened the school’s role as an academic institution, following in the footsteps of the Perkins School for the Blind and the prevailing views of the day. In 1913, the Washington Legislature separated the deaf and blind students into different institutions, and the Washington State School for the Blind (WSSB) was created (Masoodi, 2004).

In the 1940s and ‘50s, the WSSB described itself as offering an educational program that “parallels in every respect the public school programs of the state from kindergarten through ninth grade” (WSSB Biennial Report, 1949, p. 8 as cited in Masoodi, 2004). Towards this end, WSSB had strict entrance requirements that the students be “educatable” and able to care for themselves. These entrance requirements mirrored those found throughout the nation (Erin, 1993).

In the 1950s, an unexpected surge in the number of blind children led to a radical shift in the role of residential schools. First diagnosed in 1942, retrolental fibroplasia (RLF) or Retinopathy of Prematurity (ROP) was “the largest single cause of blindness ever recorded” (Lowenfield, 1956 as cited in Masoodi, 2004, p. 47). RLF was a side-effect of administering excess oxygen at birth to premature babies. Because prematurity can lead to many different problems, such as neurological impairment, multiple disabilities were more common in this population (Lechelt & Hall, n.d; Mandell, 2000).

In the space of ten years (1950 to 1960), the count of visually impaired children in the United States jumped by 158 percent (Taylor, 2005). During this time, RLF was the primary cause of blindness in Washington State as well; for instance, 75 percent of the blind students born in Washington between 1946 and 1951 were blind due to RLF (Masoodi, 2004). The rubella epidemic of the mid-1960s led to another jump in the number of blind children; the national population grew by another 50 percent from 1960 to 1970 (Taylor, 2005). This increase in students completely overwhelmed the capacity of residential schools, including the WSSB (Masoodi, 2004).

The change in the size and make-up of the blind student population led to two important developments in the educational landscape nationwide: (1) the acceptance of multiply-handicapped students in residential schools, and (2) large-scale implementation of programs for BVI students in local schools.

Residential schools began to accept multiply-disabled students after a heated battle. Parents of the growing population of blind, multiply-disabled children lobbied strongly for an educational setting where their children could get blindness-specific training. Many of the multiply-handicapped students were “functional” as opposed to “academic” students, meaning that their education consisted of learning how to care for themselves instead of meeting academic goals (Erin, 1993; Hatlen, 1996; Lueck, 1999). The prevailing view among educators and some parents was that admitting multiply-disabled students would be detrimental to the efforts to educate and socialize the academic blind

students. However, after much debate, most residential schools began to accept multiply-disabled students (Masoodi, 2004).

This admissions decision changed the core of these institutions across the United States:

It was a tremendous shock when most of the new applicants were kids with multiple disabilities. At the California school, my office was next door to a classroom where there was a blind teacher who taught algebra, geometry, Spanish and French. I literally saw her go within two years from those classes, to changing diapers on 12 year-olds. It happened that dramatically. In 62 when I went to the school for the blind it was almost entirely academic – in 66 when I left it was almost entirely ungraded (Interview with P. Hatlen, 2003 as cited in Masoodi, 2004).

Washington State followed these nationwide trends as well. WSSB began accepting multiply-handicapped students in the mid-1960s. For example, in 1952, fewer than 5 percent of the students at the WSSB were multiply-disabled, except for hearing loss. By 1964, about 20 to 25 percent had multiple disabilities, and that percentage continued to grow (WSSB Biennial Report, 1952 & Berhow, 1964 as cited in Masoodi, 2004).

The second major change was the large-scale implementation of programs for BVI students in local school districts. Two factors influenced this development: the lobbying strength of the parents and the large number of BVI children. RLF occurred mostly in middle- and upper-class families. Many of these parents didn't want to send their children away to a residential school, and they were able to influence school board members to start local programs. The large influx of BVI students meant that local districts had enough blind students to justify starting programs for them. In many cases, residential schools were so overwhelmed by the number of students that they pushed the local districts to step in and help (Masoodi, 2004).

Over time, residential schools across the nation found their enrollment numbers dropping as a growing number of BVI students chose to attend their local school districts. At the same time, the student populations attending residential schools included higher percentages of multiply-disabled students. The drop in enrollment and increase in multiply-handicapped students marked a major transition for residential schools for the blind. In the period of only a few years, they went from "schools who justified their existence by claiming to be normalizing institutions for a population too small to be educated in local districts, to residential institutions who served some of the most severely multiply disabled children in their respective states" (Masoodi, 2004, p. 53).

When Congress passed the Education for All Handicapped Children Act (commonly known as PL-142) in 1975, it formally ended the era of residential schools as the primary provider of education for blind students. However, even before implementation of PL-142, approximately 93 percent of all BVI students were educated in local school

districts (Bina, 1999). PL-142 was reauthorized in 1990 as IDEA. IDEA states that children should be educated in the “Least Restrictive Environment” appropriate for each student. Educational settings are viewed as a continuum with mainstream classrooms considered the least restrictive and residential schools viewed as extremely restrictive.

The adoption of PL-142, coupled with the long-term trend of declining enrollments, placed many residential schools for the blind in danger of closing. While some residential schools did close, others struggled to redefine themselves. Some became specialized institutions for the multiply-disabled. Most moved to an outreach model where, in addition to maintaining residential and day school components, they positioned themselves as centers of specialized knowledge offering a variety of services for local school district staff, teachers, and personnel, as well as students (Erin, 1993; McMahon, 1994; DeMario & Caruso, 2001 & Miller, 2003 as cited in Oyinlade & Gellhaus, 2005).

Local school districts also refined their services as the number of BVI students shrunk, in large part because treatment of premature infants improved and the RLF epidemic waned. Many districts went from operating resource rooms with a full-time teacher to an itinerant model where a single vision loss teacher provides training and support to BVI students in multiple schools (Masoodi, 2004).

## **CURRENT EDUCATIONAL PLACEMENT OPTIONS**

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The redefinition of educational options for BVI students is a work-in-progress that continues today. This section describes the two most common educational settings for BVI students: the local school itinerant teacher model and the residential schools/outreach services model. While the continuum of educational services includes other settings, such as day programs, there is little published research on them so they will not be discussed in detail in this report.

### ***Local Schools: Itinerant Teacher Model***

Nationally, about 90 percent of BVI students are educated at their local schools (Erin, 2003; Heward, 2003 as cited in Masoodi, 2004). Most of these students spend time in regular classrooms with sighted peers. Hebbeler (1993) found that 98 percent of BVI students in local schools took at least one class in a regular classroom in 1990, and 83 percent spent at least three-quarters of their time in regular classes. The most common model of support for blind students in local schools is the itinerant teacher (Erin, 2003; Swenson, 1995).

Itinerant teachers travel between schools, providing support to BVI students on a daily or weekly basis. These teachers provide a wide range of services for students, parents, and school personnel. In fact, some estimate that only about 50 percent of their time is spent teaching (Mandell, 2000; Swenson, 1995).

For BVI students, itinerant teachers provide academic support and teach Braille reading and writing (as appropriate), social skills, daily living skills, computer and assistive

technology skills, listening skills, orientation and mobility skills, and career education. They are also responsible for providing accessible materials and textbooks (Erin, 2003; Masoodi, 2005; Swenson, 1995; ERIC EC, 1992).

Itinerant teachers facilitate collaboration with others in the educational environment. They provide continued disability awareness training to sighted classmates and consultative services, such as in-service training and written guidelines, for school personnel. Itinerant teachers meet with in-school teachers frequently to assess the student's progress and act as an advocate and focus on ensuring that all educational team members understand the student's needs. They are a resource for parents and act as a liaison between parents and schools (Erin, 2003; Swenson, 1995).

The other main area of responsibility for itinerant teachers is student assessment. Itinerant teachers assess the educational needs of new referrals, perform ongoing evaluations of current students, and conduct literacy evaluations and comprehensive educational testing (Erin, 2003; Swenson, 1995).

Resource rooms are also used to support BVI students in local schools. These rooms have a variety of uses. In a small percentage of schools, resource rooms are used as an alternative classroom setting for BVI students. More commonly, they serve as repositories of supportive resources, such as computers with special software or copies of Braille books. Sometimes resource rooms occupy a separate room, while in other cases a portion of the library is set aside as a resource area for BVI students (Snyder, 2005).

### ***Residential School/Outreach Services Model***

After the decline in enrollments, many residential schools reinvented themselves to meet local and regional needs (DeMott, 1993; Erin, 1993). Today, residential schools are often referred to as "specialized schools" because residential education has become a small part of their educational offerings. Specialized schools offer different combinations of long-term and short-term training at onsite and offsite locations, both residential and day programs, to preschoolers, K–12, adult students, and/or educational personnel (Erin, 1993; Erin, 2003; Harley & English, 1989; McMahan, 1994). A few specialized schools focus exclusively on multiply-disabled students (Masoodi, 2004; Taylor, 2005).

Most specialized schools for BVI students incorporate the outreach model, where they provide services to the broader community in addition to their residential students (McMahon, 1994; DeMario & Caruso, 2001 & Miller, 2003 as cited in Oyinlade & Gellhaus, 2005).

Specialized schools offer a wide variety of outreach services: orientation and mobility programs, technology assistance, adaptive physical education, life-competence skills, academics, vocational training, supervised employment, recreation and leisure, visual efficiency training, listening skills, counseling speech therapy, and physical therapy (Masoodi, 2004; McMahon, 1994; Baker, 1993 as cited in Oyinlade & Gellhaus, 2005).

They also provide evaluations and offer training and consultation to local schools and parents (Masoodi, 2004; North Dakota Vision Services for the Blind website, accessed 2005). Two other major roles that specialized schools often fill are (1) resource centers for distribution of adaptive materials, and (2) centers for school-based research (Erin, 1993).

Over time, collaboration between specialized and local schools has increased, leading to more fluidity between the two educational settings. This collaboration has resulted in increases in three areas: (1) transfers between the two educational settings, (2) use of short-term placements at specialized schools, and (3) mainstreaming experiences for residential students, where the students spend part of each day attending classes at a local school district.

Specialized and local schools have become more open to transferring students between the two systems as students' needs change over time. In previous years, BVI students at residential schools tended to stay for their entire education of about 12 years. By 1990, the average stay for BVI students at a residential school was 5.5 years (McMahon, 1994).

As indicated by length of stay data, short-term placements at specialized schools are becoming more common. Typically, short stays at residential schools involve intensive training in specific skills (e.g., Braille and orientation and mobility skills), which can be especially useful after a student experiences a decrease in vision. For instance, after a decrease in vision, a student may need training in the use of assistive technology that was not previously required. Short-term placements vary in length from a week to several months (DeMott, 1993; Erin, 1993; Erin, 2003; Snyder, 2005).

Additionally, most residential schools offer mainstreaming experiences to their students, especially in the high school years (McMahon, 1994). Many residential students spend part of each day attending classes at a local school district (Erin, 1993).

Day programs, where students return home at the end of the day, are also becoming more popular within specialized schools. In 1990, 30 percent of specialized school students were day students (Hebbeler, 1993; McMahon, 1994).

## **BVI CHILDREN: UNIQUE DEVELOPMENTAL CHALLENGES AND EDUCATIONAL NEEDS**

BVI children face developmental challenges in early childhood that lead to unique educational needs once they reach school-age. Developmental delays in one area can lead to further delays in other areas; therefore, researchers agree that early identification and early interventions are critical.

This section first discusses the developmental challenges often experienced by BVI children in early childhood and the importance of early interventions in mitigating these delays. Next, we review the unique educational needs of school-age BVI children.

### **EARLY CHILDHOOD: DEVELOPMENTAL CHALLENGES AND THE NEED FOR EARLY INTERVENTION**

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Visual impairments in infants and young children limit the range and variety of learning experiences in three areas:

- Interactions with the physical environment;
- Interpersonal interactions; and
- Learning through observation and modeling of others (Shon, 1999).

These restrictions often lead to developmental delays in motor, social, cognitive, orientation and mobility, and self-care skills (ERIC EC, 1992; Lowenfeld, 1948/1992 as cited in Lechelt & Hall, n.d.).

#### ***Common Areas of Developmental Delay***

Childhood development is a complex process, and the effects of visual limitations depend on multiple factors, including the cause of vision loss (etiology), severity, age of onset, intellectual ability, environment, and presence or absence of other disabilities (ERIC EC, 1992; Lechelt & Hall, 1999). While there is wide diversity in the development of children with visual impairments, there are some areas where delays are often found. This section details the common developmental delays in the following areas: cognitive, social, motor, self-care, and orientation and mobility skills.

##### **Cognitive Skills**

Vision provides a wealth of context for learning and interpreting information, so vision impairment often leads to a lack of context and impedes the development of cognitive skills. Without vision, children have fewer opportunities to explore their world (Baird & Goldie, 1979 & Stone, 1995 as cited in Shon, 1999). For example, infants with visual impairments cannot perceive items that are beyond their grasp or are too large or small (ERIC EC, 1992).

Early intervention for BVI children often includes considerable guidance and variety of experiences in order to provide the context that a sighted child gains with a glance

(Lechelt & Hall, n.d.). One interesting example from the literature that highlights the need for contextual information is of a 6-year-old boy in a garden who kept requesting longer and longer sticks because he wanted to touch the ceiling. He didn't realize that the outdoor garden didn't have a ceiling (Gibbs, 1981 as cited in Lewis, 1987). This is contextual information that needs to be explicitly described to a blind child.

Cognitively, BVI children tend to face delays in three main areas:

- Language development;
- Classification; and
- Perspective taking.

**Language development.** BVI children appear to gain language differently, tending to:

- Label items that are experienced through olfactory, tactile, or auditory means (e.g., music or powder). Sighted children are more likely to label items that are experienced visually (e.g., moon) (Bigelow, 1987 as cited in Lechelt & Hall, n.d.).
- Use words that designate a specific item, while sighted children are more likely to use general words that describe a class of items. For instance, a BVI child might be more likely to label the family dog, while a sighted child might be more likely to label dogs in general. This is this may be due to the fact that children with visual impairments tend to experience only one of each thing, whereas a sighted child sees multiple versions (Anderson, Dunlea & Keklis, 1984 & Bigelow, 1987 as cited in Lechelt & Hall, n.d.).
- Use fewer adjectives and functional words but more action words than sighted children (Bigelow, 1987 as cited in Lechelt & Hall, n.d.).
- Use words that pertain to their own actions and desires because they are less likely to perceive others (Bigelow, 1987 as cited in Lechelt & Hall, n.d.).

**Classification.** BVI children perform better on concrete concepts than abstract concepts. They tend to show delay in acquiring relational concepts (behind, beside, in front of). This is likely not a developmental delay but simply evidence of the limitations of their experiences (Lowenfeld, 1948/1992 as cited in Lechelt & Hall, n.d.).

**Perspective taking.** Perspective-taking is the ability to understand what other people experience. School-age BVI children understand that other people have experiences of seeing that are different from their own, but they are not always able to determine what sighted people can or can't see (Bigelow, 1991b, 1991c, 1992b as cited in Lechelt & Hall, n.d.). For instance, Bigelow (1992b as cited in Lechelt & Hall, n.d.) explored children's behavior in hiding and found that blind children initially tried to hide by becoming very quiet and still. This hiding method demonstrates that the BVI children were unable to take the perspective of their sighted peers. Perspective-taking is one area where the age of onset of blindness makes a difference in developmental lags.

Alpine and Moore (1995, as cited in Lechelt & Hall, n.d.) suggest that delays in perspective-taking abilities may contribute to social isolation.

### **Social Skills**

The lack of ability to interpret non-verbal communication places visually impaired children at risk of developmental delays in social skills. In preschool and beyond, difficulties with non-verbal communication can lead to social isolation (Preisler, 1993, & Preisler & Palmer, 1989 as cited in Lechelt & Hall, n.d.).

BVI children in nursery school have difficulty interpreting other people's reactions, taking part in conversations, and expressing emotions (Preisler, 1993, & Preisler & Palmer, 1989 as cited in Lechelt & Hall, n.d.). Researchers have found that BVI children are less likely to explore, initiate spontaneous play, or imitate their caregiver's activities (Fraiberg, 1977, & Parsons, 1986b, & Skellenger, Rosenblum & Jager, 1997 as cited in Lechelt & Hall, n.d.).

Many researchers have found that visually impaired children often have problems participating in free play with other children. While sighted children spend most of their time interacting with others, BVI children spend about half their time in solitary play. They are also more likely to interact with adults than their peers (Preisler, 1993, & Preisler & Palmer, 1989, & Schneekloth, 1989, & Skillenger & Hill, 1994 as cited in Lechelt & Hall, n.d.).

In contrast to their problems with free play, BVI children tend to do well in structured play, such as playing games (Preisler, 1993 as cited in Lechelt & Hall, n.d.). Free play can be chaotic and confusing whereas structured play is more ordered. Early interventions in social and play skills usually involve a controlled environment with skill-specific support and modeling. Skellenger and Hill (1994) reported that interventions resulted in increases in functional and age-related play skills (Lechelt & Hall, n.d.).

### **Motor Skills**

Few delays have been reported for BVI children's motor skills based on stable, in-place movement (e.g., sitting, rolling, standing alone), but researchers have found more severe delays for motor skills requiring movement in space (e.g., holding up the head, crawling, creeping, and walking) (Fewell, 1991 as cited in Lechelt & Hall, n.d.). Research suggests that much of the motor skill delays could be due to the inability to view others modeling these behaviors (Lechelt & Hall, n.d.; Bandurya, 1977 as cited in Shon, 1999).

### **Self-Care Skills**

Self-care skills involve routines such as eating, dressing, grooming, and self-advocacy. Generally, visually impaired children require intervention in these skills, not because of developmental delays, but because learning by observation is not an option (Brown, 1983, & Harrison & Chow, 1993, & Langley, 1996 as cited in Lechelt & Hall, n.d.). Self-

care skills are heavily linked to skills in other domains, such as fine motor development, language, and social skills, as well as general limitations in experience (Brown, 1983, & Ferrell, 1986 as cited in Lechelt & Hall, n.d.).

### **Orientation and Mobility Skills**

Many of the limitations in experience faced by BVI children are linked to their level of orientation and mobility (O&M) skills (O'Donnel & Livingston, 1991 as cited in Shon, 1999). The goal of O&M skills is for the blind person to “travel safely, independently, efficiently, and confidently” (Shon, 1999). Researchers recommend O&M intervention in basic skills as early as possible so that the restrictions in experience are not needlessly prolonged (Dykes, 1992 as cited in Shon, 1999; Bosbach, 1988, & Dykes, 1982, & Hill, 1986, & Hill & Hill, 1996, & Joffee, 1988, & Lowenfeld, 1948/1992 as cited in Lechelt & Hall, n.d.). Hill et al. (1984) posited that O&M programs in preschool positively affect development in cognitive, motor, language, and social skills (Shon, 1999).

### ***The Need for Early Intervention***

Researchers agree that early intervention is critical for children with visual impairments. Many developmental skills are interconnected, and problems in one domain can lead to further delays in other areas (Hill et al, 1984 as cited in Lechelt & Hall, n.d.; Shon, 1999). Early intervention can reduce developmental gaps and the need for further remediation at a later time (Palazesi, 1986, & Baird & Goldie, 1979 as cited in Shon, 1999).

The first step in early intervention is identification of the child's visual limitations. Early identification has been found to be crucial because at the early phases of childhood development, delays can be minimized. Additionally, early identification of progressive vision conditions provides opportunity for therapeutic interventions, allowing children to avoid further vision loss (O'Donnel & Livingston, 1991 as cited in Shon, 1999).

Parents are key partners in the implementation of early interventions. They are the most influential figures in children's lives, especially in infancy and early childhood. Early intervention with parents can have positive impacts on both the parents and the children (Shon, 1999). Parents of BVI children need training in what to expect from their children, how to help their children develop, and how to deal with their own feelings regarding having a BVI child.

Infants and parents may have difficulty bonding due to the lack of non-verbal cues such as smiling and eye contact (Fraiberg, Smith & Adelson, 1969 as cited in Shon, 1999). If the parent-child bonding is poor, the child is put at risk of emotional difficulties (Rogers & Puchalski, 1984a as cited in Lechelt & Hall, n.d.).

Children with visual impairments communicate differently than sighted children. They will typically use their hands to express their desires, but often parents miss these cues when they look at the infant's face and think that he or she is disinterested (Lechelt &

Hall, n.d.). BVI infants do not use the same facial expressions and tend not to smile, coo, and reach for the caregivers as they approach. Instead, they are likely to stay very still and listen (Hatton, McWilliam & Winton, 2002).

Many parents who do not receive early intervention training don't interact with their children in an optimal way. They tend to talk to their children less (Fraiberg, 1977 as cited in Lechelt & Hall, n.d.) and provide them with less verbal description (Kekelis & Anderson, 1984 as cited in Lechelt & Hall, n.d.). They tend to supply children with language instead of letting the children generate the language themselves (Kekelis & Anderson, 1984 as cited in Lechelt & Hall, n.d.). Parents of BVI children often do not spend enough time communicating with their children in tactile ways (e.g. holding or cuddling), which can lead to many other developmental problems (Moor, 1976 as cited in Shon, 1999).

Depression, guilt, and disappointment can be problems among new parents of blind infants (Axline, 1954, & Fraiberg & Freedman, 1977, & Moor, 1976 as cited in Shon, 1999). These problems can be exacerbated if parents do not know how to communicate with their infants. Research suggests that early intervention in these instances is important for both the parent and child.

While some parents do not interact enough with their BVI infants, they can also err by being too overprotective. There is evidence that overprotection can also lead to developmental delays. For example, Sostek (1991) found that children with visual impairments whose parents were not overprotective tended to walk earlier than those given more parental attention (Lechelt & Hall, n.d.).

Addressing BVI children's needs through early intervention usually involves a collaborative team approach. In early childhood, parents are the primary providers of the intervention services, with coaching from professionals. In later years, the intervention teams often include vision teachers, orientation and mobility specialists, occupational therapists, physical therapists, parents, and others (Shon, 1999).

While there is agreement across the literature on the importance of early intervention, there is less consensus on the interventions that should be used or the appropriate age to begin each type of intervention. For instance, Dykes (1992, as cited in Lechelt & Hall, n.d.) surveyed orientation and mobility instructors on their techniques for teaching cane use to BVI children. He reported that all of the instructors taught the skills in different sequences and that none of the teaching techniques was used predominantly.

## **SCHOOL-AGE: THE UNIQUE EDUCATIONAL NEEDS OF BVI STUDENTS**

BVI students have unique educational needs that relate directly to the developmental delays often experienced in early childhood. In addition to the core curriculum that all students are expected to study, BVI students have a wide-ranging set of additional skills that they need to gain in order to successfully complete the core curriculum. The

expanded core curriculum is a set of guidelines put forth by the National Agenda<sup>2</sup> that delineates the skills that all BVI students should attain, regardless of educational setting (Snyder, 2005).

The expanded core curriculum includes the development of skills in the following areas: compensatory academics, communications, orientation and mobility, social interaction, daily-living skills, recreation/leisure, career/vocational, and visual efficiency (Hatlen, 1996). Some of these skills are disability-specific because of the teaching method (e.g., social skills and daily-living skills), while some involve disability-specific content (e.g., Braille or the long cane) (Hatlen, 1990, & Dote-Kwan & Chen, 1995 as cited in Lechelt & Hall, n.d.). This section will review the expanded core curriculum in detail.

### ***The Expanded Core Curriculum***

#### **Compensatory or Functional Academic Skills, Including Communication Modes.**

Compensatory academic skills enable BVI students to receive an education equivalent to that of a sighted student. Such skills include concept development, spatial understanding, study skills, speaking and listening, and communication skills (Hatlen, 1996).

In academic settings, BVI students may learn to read using Braille, large print, magnification devices or a variety of other options (Hatlen, 1996; Lechelt & Hall, n.d.). Regardless of their means, they will need to receive instruction in this area (Hatlen, 1996).

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<sup>2</sup> See the description of The National Agenda for the Education of Children and Youths with Visual Impairments, Including Those with Multiple Disabilities in the section on National and State Laws and Policies.

### **Orientation and Mobility**

Students need to learn how to travel as independently as possible, whether in school or in the broader environment. Case studies show that strong orientation and mobility skills are associated with less social isolation in public schools (Dimigen, Roy, Horn & Swan, 2001). Lewis & Iselin (2002) studied independent living skills among children with and without visual impairments, and they found that the number of children with a visual impairment who could walk independently to a friend's house was "alarmingly low." "Being able to walk independently to a friend's house can open doors to socialization, recreational activities, and inclusion. Not being able to walk independently to a friend's house or around the school building can lead to dependence, lack of social inclusion, and isolation" (Shapiro, Lieberman & Moffett, 2003).

### **Social Interaction Skills**

Research has shown that careful, sequential instruction in social interaction skills is necessary because blind students cannot model observed social interactions. Without intervention, patterns of segregation and isolation in early childhood may continue (Hoben, 1980, & Hoben & Lindstrom, 1980, & MacCuspie, 1996, & Schneekloth, 1989 as cited in Lechelt & Hall, n.d.).

As in the study of nursery school BVI students who were more likely to spend time in solitary play, school-age BVI children also frequently find themselves socially isolated. In a study of students ages seven to 13 years old, Schneekloth (1989) found that BVI children spent at least half of their playtime alone and one-third with an adult (Lechelt & Hall, n.d.). Hoben and Lindstrom (1980) observed classroom interactions of 22 BVI students in grades one to 12 and concluded that they were less likely to initiate or participate in peer interactions compared to the sighted students (Lechelt & Hall, n.d.).

Teaching can also be informed by training on how to best integrate BVI students into the classroom. Studies have shown that teachers can contribute to segregation by how they arrange the desks and deliver specialized services (Hoben, 1980, & Hoben & Lindstrom, 1980 as cited in Lechelt & Hall, n.d.).

### **Independent Living Skills**

Education in independent living skills (also called daily-living skills) has been motivated by the concern that students can graduate with good academic skills but be unable to care for themselves (CNIB, 1996, & Hatlen, 1990, & Tuttle, 1986 as cited in Lechelt & Hall, n.d.). These skills include subjects such as personal hygiene, money management, food preparation, time monitoring, and self-advocacy (Hatlen, 1996; Lechelt & Hall, n.d.).

One of the important skills needed for independent living is self-advocacy: the ability to ask for help when needed and to respond to questions about the disability. Krebs (2002) described several case studies that showed that students felt empowered when they were able to explain their disability in the context of their strengths, weaknesses, and areas where they need help. For instance, after receiving training in self-advocacy, one

student wrote, “I get this very good feeling when I feel like I'm independent. In real life you have to step out for yourself and say, ‘This is what I need help with.’”

Without training, students do not always seek out the information that will help them advocate for themselves. For instance, Sacks and Corn (1996 as cited in Lechelt & Hall, n.d.) conducted a study of BVI students' knowledge about their disability. Their results confirm the need for intervention in this area: 66 percent could not name their visual impairment, only 14 percent knew how they acquired the impairment, and over half (52 percent) stated that they did not talk to their parents about their visual impairments.

### **Recreation and Leisure Skills**

BVI students often need help selecting and learning recreation and leisure activities. Since they are unable to observe many of the options for recreation and leisure activities, BVI students need help learning about the range of activities and gaining the skills necessary to participate (Hatlen, 1996).

### **Career Education**

Much of the information that sighted students have about the world of work is gained through vision. BVI students need education in this area to ensure that they have a well-rounded understanding of the types of work that are available (Hatlen, 1996). About 70 percent of BVI adults are unemployed, so this is an important area of educational emphasis (Hebbeler, 1993; Taylor, 2005).

### **Visual Efficiency Skills**

Many visually impaired students have some visual acuity. With training, they can learn to use their remaining vision more efficiently, meaning that they will have less reliance on technology and other accommodations (Hatlen, 1996).

## THE EFFECTIVENESS OF DIFFERENT EDUCATIONAL SETTINGS

This section explores the effectiveness of different educational settings. It explores the difficulties of drawing any definitive conclusions, describes some of the advantages and disadvantages of different settings, and discusses the research on outcomes, including social, academic, mobility, employment, and residential independence.

### **DOES THE RESEARCH SUPPORT ONE PLACEMENT TYPE OVER ANOTHER?**

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While this is a reasonable question to ask, it is impossible to answer. There are three main factors impacting the question of effectiveness: the students, the classroom, and the outcome measure. None of these factors has a single, clear definition of what makes an effective placement.

#### **The Students**

The population of visually impaired students is so heterogeneous that it is impossible to identify a single educational setting or set of services that apply to the entire population. Student needs differ depending on the cause of the eye condition, age of onset, level of vision, the presence or absence of early interventions, and other disabilities (Hebbeler, 1993; Lechelt & Hall, n.d.). Eltsner (1983) suggested that “the frequency of concomitant disorders was so high that a sample of children with no disabilities other than congenital blindness might not represent the general population of children who are congenitally blind” (Lechelt & Hall, n.d., p. 15). For instance, he found that over 80 percent of visually impaired preschoolers also had language disabilities (Eltner, 1983 as cited in Lechelt & Hall, n.d.). An additional complication is the fact that often additional disabilities are undiagnosed (Snyder, 2005).

#### **The Classroom**

Just as there is no single profile of a BVI student, there is no simple definition of any of the educational settings.

- Schools’ structures and activities vary according to their educational level. Compared with elementary schools, high schools in local school districts have a more “fragmented” day, with a patchwork of classes. High schools offer some flexibility of scheduling, with vocational education as one of the choices. The most effective educational setting (special school or local school district) at the elementary school level may be different than in high school.
- The line between different educational settings is blurred. In local schools, students can attend special education classes and regular classes. In specialized schools, students can live in a residential setting, attend day programs, attend short-term programs, and/or attend local school classes for part of each day (Erin, 1993; Erin, 2003; Harly & English; 1989; McMahon, 1994). Additionally, it is becoming increasingly common for students to move back and forth between local school districts and specialized schools (McMahon, 1994).

- Quality of education varies from classroom to classroom within a single educational setting. As Hebbeler (1993) states, “A good education is defined by what goes on in the setting, not just who else is in it.”

### **The Outcomes**

There are many different ways to measure the effectiveness of different educational settings, such as academic performance, social skills, mobility, postsecondary enrollment, employment and wages, and community involvement after graduation. As Hebbeler (1993) found, “The academic and social domains may sometimes conflict; a setting that promotes one may negatively affect the other.” It’s highly unlikely that a single educational setting could meet all the needs of all BVI children all the time (Hebbeler, 1993). Instead, the consensus across the literature supports a continuum of placement options.

### **State of the Research**

Overall, there is little research on the effectiveness of different educational settings for students with visual impairments, especially comparative research. Most of the research consists of case studies or non-experimental program evaluations. Many of these evaluations were performed by in-school staff, not an outside researcher. It is impossible to glean much information about the relative effectiveness of various programs by reviewing research conducted on a single program. As mentioned above, there is such variation in the population, schools, and outcome measures as to render meta-analysis meaningless.

There is far more research on specialized schools than on local school districts. This may be because political pressures to justify the existence of specialized schools may make funding for research a higher priority. Additionally, some specialized schools now include research as one of their mandates, and often their staff includes personnel trained to conduct research (Erin, 1993). In comparison, itinerant teachers in local schools place teaching as their main priority, and they are often not trained in research methods (Snyder, 2005). Single school districts have insufficient numbers of students with visual impairment, a low-incidence disability, to conduct rigorous evaluations, and programs are often not comparable across districts. To standardize measurements of BVI students, treatments, and effects, a large central funding source and a rigorous technical team is needed, and these conditions are rarely found outside of specialized schools.

Another challenge to finding a conclusive answer in the literature regarding the most effective educational setting is the fact that visual impairments are a low-incidence disability. The sample sizes in empirical studies are generally quite small, and the students cannot be randomly assigned to different settings. While there are students of both high and low intelligence in all settings, there is evidence that local school districts tend to attract higher-performing students. Hebbeler (1993) found that 35 percent of BVI students in special schools had an IQ below 75 compared with 21 percent in local schools.

Studies that simply compare the outcome results of students in each educational setting run the risk of severe selection bias. Research shows that the BVI students in specialized schools and local school districts can be quite different. The many factors that affect the student's placement in a particular educational setting also affect outcome results unless the researcher controls for them. These factors include (but are not limited to) household income, gender, ethnicity, presence of additional disabilities, urban/rural/suburban setting of the school, and geographic region (Hebbeler, 1993). In addition, research has shown that characteristics of the person making placement recommendations can also affect the placement decisions (Kim & Corn, 1998). It is difficult, if not impossible, to control for all factors that may be different among students in each setting.

As in all research, studies exploring the effectiveness of different settings can only speak to the programs as they were at the time of the study. Most research on this topic was published in the early 1990s and is based on students and programs in the 1980s and earlier. Educational programs tend to evolve over time; the findings at the time of the study may not apply today (Hebbeler, 1993; Lechelt & Hall, n.d.).

While the comparative research is sparse, there are some studies that add to our understanding of this topic.

## **THE ADVANTAGES AND DISADVANTAGES OF DIFFERENT SETTINGS**

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Most published work on educational settings for BVI students consists of opinion pieces, not methodically rigorous research. While they are not conclusive evidence, the research provides a valuable overview of advantages and disadvantages associated with each model. This section focuses on local school districts and specialized schools because these are the two educational settings where most of the research has been conducted.

Advantages	Disadvantages
<b>Local School Itinerant Teacher Model</b>	
<ul style="list-style-type: none"> <li>• Students can live at home, which creates opportunities for stronger parent-child bonding (Swenson, 1995).</li> <li>• Students can attend their neighborhood schools and have “normal” academic and social experiences (Swenson, 1995).</li> <li>• Students can develop friendships with peers who live close-by (Swenson, 1995).</li> <li>• Students attend the same schools as their siblings, which gives them more support in the schools and allows parents to focus their attention on only one school (Swenson, 1995).</li> <li>• Students have shorter bus rides to school so they have more time to devote to their education (Swenson, 1995).</li> </ul>	<ul style="list-style-type: none"> <li>• Itinerant teachers are often overworked (Mandell, 2000; Hatlen, 2002; Hatlen, 2004). They may be responsible for as many as 40 to 50 students in 20 schools, covering a few hundred miles per week (Mandell, 2000).</li> <li>• Itinerant teachers often have an inflexible schedule, which means that they cannot spend as much time as they would like with a particular student (Swenson, 1995).</li> <li>• Some skills (e.g., Braille reading and orientation and mobility) may require an intensity of service that the itinerant model cannot provide (Lechelt &amp; Hall, n.d.; Masoodi, 2004; Scholl, 1993).</li> <li>• Students may experience a sense of difference if they are the only BVI student at their school (Swenson, 1995).</li> <li>• Social isolation is a possible outcome, especially if the students do not receive adequate training in social skills (Hatlen, 2004).</li> <li>• Students may not be exposed to positive blind role models, and they will have fewer opportunities for learning with BVI peers (Swenson, 1995).</li> </ul>
<b>Specialized Schools: Outreach Model</b>	
<ul style="list-style-type: none"> <li>• Special schools serve as centers of expertise and materials (Baker, 1982 in McMahan, 1994; Stenehjem, 1993 as cited in Oyinlade &amp; Gellhaus, 2005).</li> <li>• Attending classes with BVI peers leads to more informal peer teaching opportunities (Hartz, 2000) and less of a sense of difference from peers (Swenson, 1995).</li> <li>• Students are more likely to be exposed to positive blind role models—both peers and others—in a special school (Swenson, 1995).</li> <li>• All classes reinforce blindness-specific skills (Bina, 1999).</li> <li>• There is a greater possibility of total environmental control (Baker, 1982 as cited in McMahan, 1994).</li> <li>• Short-term placements in residential schools can provide local school district students with skills that need intensive instruction (MacCuspie, Harmer, McConnel, Fricker &amp; Johnson, 1993).</li> </ul>	<ul style="list-style-type: none"> <li>• The environment at the specialized school does not simulate the one that the students must go to after graduating (Baker, 1982 as cited in McMahan, 1994; Scholl, 1993).</li> <li>• Specialized schools do not offer education with sighted peers (Hatlen, 2002; Baker, 1982 in McMahan, 1994).</li> <li>• Specialized schools run the risk of accepting behavior that would not be condoned in general society (Hatlen, 2002; Baker, 1982 as cited in McMahan, 1994).</li> <li>• Teachers at specialized schools may not always maintain high standards for students (Hatlen, 2002; Baker, 1982 as cited in McMahan, 1994).</li> <li>• Students often live far away from their families (Snyder, 2005).</li> </ul>

## **THE FINDINGS: AVAILABLE OUTCOMES RESEARCH**

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### **Social Outcomes**

There is little conclusive evidence on the most effective educational methods for developing social skills and confidence in children with visual impairments.

Research has shown that in public school settings, BVI students often spend less time interacting with their peers than sighted children do, and they spend more of their free time with their teachers (Schneekloth, 1989, & Hoben & Lindstrom, 1989 as cited in Lechelt & Hall, n.d.). BVI children have been found to have fewer friends than their sighted peers; they tend to rely more on their parents for support (Keff, 1997 as cited in Shapiro, Lieberman & Moffett, 2003).

While BVI students may face social challenges in the local school setting, the specialized schools are not without their downsides as well. Phillips and Corn (2003) surveyed 36 students at a special school for the blind. Student opinions indicated dissatisfaction with the small class sizes and a feeling that they were missing out on the real world experiences of a regular high school. Most felt that they would have a more active social life in a regular school. It is important to note, however, that these students had not, in fact, attended a local school. The study compared students' expectation of local schools, not the experiences of students in both education settings. On the positive side, the surveyed students expressed enjoyment at spending time with other children with visual impairments, a sentiment that is frequently mentioned in the literature.

Erwin (1993) explored the social participation of 28 preschool age children, 14 in specialized schools and 14 in integrated settings. When controlling for level of visual impairment, age (36 to 48 months and 49 to 67 months), gender, and presence of additional disabilities, Erwin found no statistically significant differences in the social participation behaviors between the two settings. While these results are interesting, the small sample sizes make it difficult to draw any strong conclusions.

In 1977, Crandell and Streeter examined the social adjustment of BVI students in different educational settings. The subjects consisted of four groups of at least 25 randomly selected high school and college students: (1) sighted students, (2) BVI students from a residential setting, (3) BVI students from a public school setting, and (4) BVI students who had attended a combination of the school settings. There were no attempts to control for other factors.

Crandell and Streeter found that students who attended a combination of residential and public schools were more socially adjusted followed by students attending a residential school. BVI students in local schools demonstrated the poorest social adjustment. It is difficult to determine to what extent this study reflects the educational settings today. Programs in local schools are likely very different today compared with the late 1970s, with attention placed on the expanded core curriculum, which includes the teaching of

social skills. However, these results may offer support for the continuum of educational settings, suggesting that students who are able to move between the two settings have their needs met best.

Spencer, Head, Van Dusen Pysh and Chalfant (1997) tested 13 BVI students in third through sixth grade on measures of internalized self-responsibility and found no differences between the students in specialized schools and those in an integrated setting. They attempted to control for level of intelligence and excluded children with multiple disabilities. However, the number of subjects is so small that little weight can be given to these results.

Probably the most interesting (and most scientifically rigorous) comparative research on educational settings is the National Longitudinal Transition Study (NLTS). Mandated by Congress in 1983 and sponsored by the Office of Special Education in the U.S. Department of Education, the NLTS explored postsecondary trends in employment, wages, education, and residential independence in the first five years after high school. The survey focused on a population of over 8,000 youths with disabilities (not only visual impairments), ages 13 to 21, receiving special education services in secondary school in 1985. NLTS was a two-wave longitudinal design, collecting data in 1987 and 1990 (Blackorby and Wagner, 1996). (A new version of the study, NLTS-2, began collecting data in 2001 and is a ten-year study.)

One of the subtopic reports resulting from the NLTS data focused on a comparison of youth with disabilities attending regular classes in a local high school versus those in special education classes (also at a local high school). Data were collected from students attending special schools as well, but it was not included as a comparison group for all measures (Hebbeler, 1993).

Multivariate analyses were conducted for some research questions. Researchers considered the following factors as appropriate for each analysis: demographic characteristics (gender, ethnic background, household income), student characteristics (IQ, reading level, math level, functional mental skills, self-care skills, community living skills), community characteristics (type of community – urban/suburban/rural and geographic region of the country), a variety of school factors (including size, average daily attendance, percentage of low-income students, types of support offered to regular education teachers when disabled students are in their classes), and courses taken by the student (specific courses as well as vocational/regular designation). While this study considers many more factors than any other research on this topic, the factors in the NLTS model explain only 38 percent of the variance in regular education participation.

The NLTS found no differences in the social isolation of students attending local high schools and those in special schools when the affects of disability, skill level, demographic, community, and school factors were held constant.

Overall, 51 percent of BVI students belonged to school groups. Students in special schools were 11 percent more likely to belong to a group when controlling for student

and community factors. Involvement in a school or community group was associated with lower absenteeism, lower probability of dropping out, and lower probability of course failure with disability, demographic, and other factors held constant. The researchers were unable to draw any conclusions about whether group involvement contributed to these positive indicators or was simply more common among the more capable students.

While the NLTS does not compare post-high school outcomes by regular versus special schools, they do report outcomes by disability, which adds to our understanding of the BVI population. In the social dimension, the study found that 14 percent of BVI students were not active in the community in the first three years after high school.

### **Academic Outcomes**

There is little research comparing academic outcomes of BVI students in different educational settings. However, research is available that describes BVI academic outcomes in general or in a single educational setting.

The NLTS includes information about many different academic outcomes; however, none of these results compare special schools with regular schools. In academic outcomes, residential school students are included in the same category as special education students in local schools. While the data improve our understanding of the BVI student population, it is unclear to what extent they inform the question of the relative effectiveness of different educational settings (Hebbeler, 1993).

The NLTS found that, overall, among BVI students in local high schools:

- The average grade point average (GPA) was 2.6 (for those attending all mainstream classes) and 3.0 (for those receiving special education services);
- 51 percent took advanced math classes; and
- 62 percent took foreign language courses.

Eighty-three percent of BVI students in local high schools spent at least 75 percent of their time in regular classes. Fifty-eight percent of their time was spent in regular education *academic* classes, as opposed to regular education vocational classes or special education classes. Of the BVI students attending local high schools, over one quarter (29 percent) achieved success, defined as spending at least 75 percent of their time in regular classes and maintaining a GPA of at least 3.0 (Hebbeler, 1993).

NLTS researchers concluded that BVI students who spent more time in regular classrooms were more likely to struggle academically while in high school compared with those receiving special education services. In the regular classroom, they received lower grades and were more likely to fail a class. In grades nine through 12, BVI students earned an overall average GPA of 2.6 in regular classes and 3.0 in special education classes. BVI students failed an average of 4.8 percent of their regular classes

and 2.5 percent of their special education classes. However, for those who were able to complete high school, spending more time in the regular classroom was associated with positive outcomes, including a higher probability of competitive postsecondary employment (Hebbeler, 1993). It is important to note that this conclusion does not specifically compare special schools with local school districts (Hebbeler, 1993).

Many of the post-school outcomes in the NLTS were explored through clustering the disabilities into four groups: mild, sensory, physical, and severe. BVI students were grouped with students with hearing impairments in the sensory cluster. However, some results were broken out by individual disability.

In the first three years after high school, over half the students enrolled in a postsecondary academic program (54 percent), and an additional 15 percent enrolled in a postsecondary vocational program. Multivariate analysis showed that there was no relationship between the amount of time spent in regular classes and postsecondary academic enrollment when other factors were controlled.

By three to five years after graduation, 57 percent of BVI students in the NLTS had attended some form of postsecondary education compared with 68 percent of the general population. Thirty-three percent attended a four-year institution, 28 percent attended a two-year college, and 16 percent attended a vocational school (Blackorby & Wagner, 1996).

The NLTS explored the relationship between attendance in college preparatory classes and postsecondary academic enrollment. Fifty-one percent of BVI students in grades nine through 12 took an advanced math course (geometry, trigonometry, calculus), and 62 percent took a foreign language course. As expected, youths in the sensory disability cluster who took one of these courses were more likely to enroll in postsecondary academic education (by 19 percent) compared with BVI students who did not enroll in these classes. This result did not control for other factors, such as student intelligence (Hebbeler, 1993).

Other than the NLTS, little comparative research has been done on academic outcomes in both special schools and local school districts. In 1977, Winkley surveyed rehabilitation counselors for 28 residential school students and 95 students in integrated school settings. His analysis concluded that there was no difference in the academic college preparation of students from the two educational settings. However, this is a difficult study to interpret because it does not state the indicator used to measure college preparation level, and it does not control for any other factors, including age, gender, or intelligence (Hebbeler, 1993).

Several studies have looked at the post-school outcomes of BVI students who attended residential schools. Howze (2000) reported that the Missouri School for the Blind graduate feedback survey found that nine out of 10 graduates attended postsecondary programs. This high percentage seems out of range when compared with other postsecondary attendance rates. It is unclear how the school selected the population to

survey (e.g., if this result only included students of high intelligence). In general, surveying alumni is an unreliable method to collect post-school outcome data because the subjects tend to report higher placement rates than are actually the case; for instance, they may report that they are attending college if they simply have plans to do so (WSU-SESRC, 2005).

Head et al. (1993) surveyed 34 residential schools and found that of the 241 students who graduated or completed programs, 51 percent went on to postsecondary education or vocational training, and 15 percent received on-the-job training.

According to the American Printing House, literacy among BVI students has been declining since the 1960s. Some researchers suggest that the decline in literacy is in some way connected with the increased use of the itinerant teaching model, which may not provide enough hours of service to effectively teach skills such as Braille (Mullen, 1990, & Pester, 1993, & Spungin, 1989 as cited in Lechelt & Hall, n.d.; Hatlen, 2002; Chen & Dote-Kwan, 1995 as cited in Masoodi, 2004). In 1968, 40 percent of the students registered with APH used Braille and 45 percent used large print. By 1993, only 10 percent used Braille and 31 percent were officially designated as non-readers (Chen & Dote-Kwan, 1995 in Masoodi, 2004). While this is not conclusive research, these statistics do provide support for the theory that itinerant teachers do not have enough time with students to provide intensive instruction in the subject (Mullen, 1990 in Lechelt & Hall, n.d.; Hatlen, 2002).

### **Employment Outcomes**

While postsecondary educational attendance rates among BVI students resemble those of their non-disabled peers, employment outcomes are less positive. Research shows that only about one-third of BVI graduates are competitively employed, and wages are often low (Hebbeler, 1993; DeLaGarza & Erin, 1993; Verret, 1991 as cited in Geruschat, 1993; Oddo et al., 2002).

The NLTS found that 30 percent of BVI youth were employed in the first three years after graduation. Among those who were employed, they earned average annual compensation of \$7,303 in 1990 dollars. Controlling for other factors, students in the sensory disability cluster (BVI and hearing impaired) were 15 percent more likely to be competitively employed if they spent all their time in high school in regular classes. They also earned higher wages; average annual compensation was \$1,550 higher for BVI and hearing impaired youth who had spent 100 percent of their time in the regular classroom.

The Missouri School for the Blind graduate survey found that eight of ten of their graduates were employed. Like their postsecondary attendance rates, this employment rate seems quite high. However, the published results do not contain enough information about the study methods to evaluate the quality of the research (Howze, 2000).

Head et al. (1993) surveyed 34 residential schools and reported that only 15 percent of graduates were employed directly after high school.

DeLaGarza & Erin (1993) conducted structured interviews with 70 graduates of the Texas School for the Blind and Visually-Impaired who had been out of school from three to eight years. They limited the population to youths who were not deaf and had a verbal intelligence quotient of at least 70. The employment rate for this group was 36 percent.

Geruschat (1993) surveyed 62 graduates of a residential school for the blind who had been out of school from four to eight years. Seventy-nine percent of the subjects were found to be competitively employed, in supported employment, or participating in work activity centers or day care programs. This high rate of employment is likely because the author used a broader definition of employment than other studies. Wages were reported to be below minimum wage: The graduates who were identified as being capable of competitive employment were earning an average of \$2.44 per hour, and those who were evaluated as being capable of supported employment were earning only \$0.25 per hour.

Oddo et al. (2002) conducted structured telephone interviews with two cohorts of graduates from a state school for the blind. Cohort one contained 16 graduates from the classes of 1993–95. Cohort two consisted of 14 graduates from 1996–99. Researchers found that 78 percent of the graduates in cohort one and 62 percent of cohort two were employed in competitive or supported employment. Cohort one earned a median of \$4.64 per hour, and cohort two earned a median of \$6.00 per hour. (The state minimum wage was \$4.65 at the time that cohort one was interviewed and \$5.15 per hour when cohort two was interviewed.)

### **Mobility Outcomes**

Research is quite sparse comparing mobility outcomes between educational settings. Blackhurst and Marks (1977) surveyed teachers of 152 BVI children, half enrolled in local school programs and half enrolled at residential schools. Researchers controlled for chronological and mental IQ, years in school, and tests of word meaning, paragraph meaning, and arithmetic applications. Teachers rated each child on mobility in the classroom, school building, and school grounds on a scale of one to seven. The researchers found that BVI students in local schools were significantly more mobile than their peers in residential schools. While these results are interesting, they may reflect differences in how teachers performed the ratings, as well as pre-existing differences in mobility between students in each type of setting.

### **Residential Independence Outcomes**

Residential independence after high school has been used in conjunction with educational and employment placement rates to measure the effectiveness of BVI education. Currently, there is no consensus in the literature for whether youths with BVI are more likely to live independently (outside their family home) after attending a special school or local school.

The NLTS found that 39 percent of BVI youths were living independently in the first three years after high school. (This is defined as living alone, with a spouse or

roommate, in a college dormitory, or in military housing—not as a dependent.) This is due in part to the high college attendance rates among BVI youths. With other factors controlled, there was no relationship between residential independence and the amount of time spent in the regular classroom in high school.

In Garuschat's 1993 survey, he found that 69 percent of the graduates of a residential school for the blind were living at home with their families, primarily because of the family's choice.

## CURRENT ISSUES

Two factors that greatly impact the education of BVI students today are technological developments and the shortage of qualified teachers.

### TECHNOLOGICAL DEVELOPMENTS

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In the past, technological accommodations in the classroom were limited to the transcription of written materials (Hatlen, 1990 as cited in Lechelt & Hall, n.d.). Recent technological developments have provided BVI students with tools that increase their independence and improve their ability to communicate (Hartz, 2000; Coughlan, 2001).

Computerized technological accommodations are often grouped into input and output technology. Input devices allow the user to communicate with the computer, while output devices help the user understand the computer's output (Graeme, 2001).

This section explores input and output devices for computers, other technological accommodations that don't involve computers, the advantages and disadvantages of technological adaptations, and the availability of technology in different educational settings.

#### ***Input Devices***

Input technology includes the keyboard, mouse, touch screen, speech recognition software, and optical character recognition devices.

Some BVI students access computers using adaptations for the keyboard and mouse. These include Braille keyboards, Braille or large print keyboard overlays, and touch screens (Garrick Duhaney & Duhaney, 2000; Graeme, 2001; Reilly, 2001). Adaptations for using the mouse include enlarged cursors, computer settings that reduce the speed of the cursor, and alternate input methods like using the keyboard shortcut keys (Graeme, 2001).

Additionally, some students use speech recognition software to access their computers. Voice recognition systems, such as DragonDictate, can be used to control computer systems or transcribe the student's voice (Reilly, 2001).

Scanners with optical character recognition (OCR) are a common method to translate written material into electronic text files without having to retype the documents. Once the documents are available electronically, they can be read through a number of different output devices (Reilly, 2001). Portable OCR readers are in development now. For example, the next version of the Kurzweil Reading Machine will be a pocket-sized device that scans text and reads it aloud. This will be useful for a variety of tasks, from reading documents when a computer is not available to reading menus and labels on consumer goods. It is expected to be available by the end of 2005 (National Federation of the Blind website, accessed October 9, 2005).

## Output Devices

Students are able to access information in a computer via many different methods. Monitors can be useful reading tools because they are lighted internally so the user can get close to the screen without casting a shadow that obscures the reading material (Graeme, 2001). High resolution computer screens allow fine control in terms of size and color (Garrick Duhaney & Duhaney, 2000; Graeme, 2001). Screen magnification can be accomplished via software that adjusts the size of the text and graphics and controls the number of lines of text on the page or via physical lenses that are attached to eyeglasses or to the monitor (Garrick Duhaney & Duhaney, 2000; Reilly, 2001).

Many BVI students access computers through the use of voice synthesizers. With variable speed control, trained users can listen to audio output at speeds that resemble a “sound blur” to the untrained ear (Lee, Groom & Groom, 1996). Job Access with Speech (JAWS) is one example of a software program that outputs the contents of the screen to the speakers or to a refreshable Braille display (Reilly, 2001). Refreshable Braille displays are hardware devices that produce tactile Braille output.

Printers that produce sheets of embossed Braille text are another form of computer output accessible to Braille readers (Graeme, 2001; Hartz, 2000).

## Combined Input/Output Devices

While it is helpful to structure the exploration of technology into input and output devices, this is a somewhat artificial division. Many of technology incorporate both input and output functions, such as the Braille ‘n Speak, Braille Lite, and Perkins Brailler. The Braille ‘n Speak is a portable personal note taker that allows the user to input via a seven-key Braille keyboard and listen to output via an internal speech synthesizer. Output can also be transferred to a computer, where it is translated into standard text, or printed with a separate Braille embosser or standard printer. The Braille ‘n Speak is available in 16 languages and includes additional functions such as word processing software, a talking clock, phone book, calendar, and a scientific calculator (Garrick Duhaney & Duhaney, 2000; Freedom Scientific website, accessed October 9, 2005; Graeme, 2001; Hartz, 2000; Reilly, 2001).



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The Braille Lite is analogous to a laptop computer. The user inputs via Braille and reads the output via a 40-cell refreshable Braille display. This display makes editing documents much easier than working with auditory output, especially for checking spelling. It also includes cursor-routing, which allows users to insert the cursor exactly at the point they wish to begin editing. The user can scroll through documents line-by-line or by sentence or paragraph. This is a powerful feature because it

allows the user to search documents much faster than using auditory output. Output can also be reviewed via an internal speech synthesizer, transferred to a PC where it is translated into standard text, or printed with a separate Braille embosser or standard printer. The Braille Lite includes an internal modem and word processing software, along with functions such as a talking clock, phone book, calendar, and a scientific calculator. Additional software can be purchased separately, such as spreadsheets, advanced mathematical functions, and money management software (Freedom Scientific website, accessed October 9, 2005; Graeme, 2001; Hartz, 2000).

The Perkins Brailler is a Braille typewriter that produces pages of embossed Braille text. It can be converted to connect to a computer, where the output appears as text on the screen, or can be read aloud by voice output software (Graeme, 2001; Perkins School for the Blind website, accessed October 9, 2005).

### ***Other Tools***

Other technological accommodations do not involve the computer at all. These include the use of closed-circuit televisions (CCTV) to magnify printed text and portable audio recorders used to record lectures and play them back at high speeds (Reilly, 2001; Lee, Groom & Groom, 1996). Electronic speaking dictionaries, such as the Franklin Language Master, have proven very helpful to students. Electronic dictionaries free a lot of space in the classroom when they are used as an alternative to a Braille college dictionary, which consists of about 72 large volumes (Hartz, 2000). Other tools are also available with audio components, such as talking calculators (Coughlan, 2001).

### ***Advantages of Technology***

The technological tools available today offer many advantages: they improve communication, speed the availability of accessible classroom materials, and increase students' independence.

These tools improve communication between BVI students and teachers who do not read Braille. Students can write in Braille, and the computer will translate their document into standard text. Alternately, the student could dictate their document to the computer. The teacher can write comments in a text file, which the student can output to the computer's speakers, a refreshable Braille display, or a Braille embosser. (Coughlan, 2001)

Technology helps make classroom materials available in accessible formats much more quickly than in the past. One of the biggest challenges that BVI students face in the classroom is gaining access to textbooks and other classroom materials in a timely fashion. While this issue is not completely resolved, technological advances have helped quite a bit. Today, textbooks and other materials can be scanned with OCR tools, and the electronic file can be accessed through a variety of output methods (Hartz, 2000).

With these technological tools, students gain a great deal of independence. Students can explore the Internet, use email, select their own recreational reading materials, and share information more easily (Hartz, 2000).

### ***Disadvantages of Technology***

Like all technology, these tools have their drawbacks. Compatibility among the equipment is sometimes a problem (Coughlan, 2001; Hartz, 2000). Students come to rely on equipment that sometimes breaks down, and some of these devices can be very heavy for young children (Coughlan, 2001).

### ***Availability of Technology in Different Educational Settings***

While we were unable to find a study that compared the availability of technological tools in different educational settings, it is reasonable to assume that specialized schools have a wider variety of technology available since they often serve as resource centers for the distribution of adaptive materials.

## **TEACHER SHORTAGE**

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One major issue affecting education for the blind today that spans different educational settings is the shortage of qualified teachers. As of 2000, there were about 6,700 certified teachers working in the field, and it was estimated that 5,000 additional teachers were needed nationwide to fill the gap (ED, 2000 in Hicks, 2003; Association of Education and Rehabilitation, 2003 in Masoodi, 2004). There are only about 33 programs nationwide that train certified teachers for the blind. These programs produce about 250 graduates per year, enough to cover retirements at the current rate (Hicks, 2003). This situation is likely to become more critical due to two factors: (1) low enrollment rates in the teacher training programs, and (2) many teachers for the blind are within ten years of retirement (Spungin, 2003 in Oyinlade & Gellhaus, 2005; Mamer, 2001 in Oyinlade & Gellhaus, 2005). Rural schools have an especially difficult time recruiting and retaining teachers due to their isolated environment and low teacher salaries (Jager, 1999).

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