



SEEP

Special Education Expenditure Project

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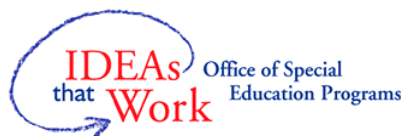
Expenditures on Specialized Equipment for Special Education Students, 1999-2000

Report 6
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SEEP Reports

This document is a part of a series of reports based on descriptive information derived from the Special Education Expenditure Project (SEEP), a national study conducted by the American Institutes for Research (AIR) for the U.S. Department of Education, Office of Special Education Programs (OSEP). SEEP is the fourth project sponsored by the U.S. Department of Education and its predecessor, the Department of Health, Education and Welfare, in the past 40 years to examine the nation's spending on special education and related services. See Kakalik, Furry, and Carney (1981), Moore, Strang, Schwartz, and Braddock (1988), and Rossmiller, Hale, and Frohreich (1970).

The SEEP reports are based on analyses of extensive data for the 1999-2000 school year. The SEEP includes 23 different surveys to collect data at the state, district, and school levels. Survey respondents included state directors of special education, district directors of special education, district directors of transportation services, school principals, special education teachers and related service providers, regular education teachers, and special education aides. Survey responses were combined with other requested documents and data sets from states, schools, and districts to create databases that represented a sample of approximately 10,000 students with disabilities, more than 5,000 special education teachers and related service providers, approximately 5,000 regular education teachers, more than 1,000 schools, and well over 300 local education agencies.

The series of SEEP reports will provide descriptive information on the following issues:

- What are we spending on special education services for students with disabilities in the U.S.?
- How does special education spending vary across types of public school districts?
- What are we spending on due process for students with disabilities?
- What are we spending on transportation services for students with disabilities?
- How does education spending vary for students by disability and what factors explain differences in spending by disability?
- What role do functional abilities play in explaining spending variations for students with disabilities?
- What are we spending on preschool programs for students with disabilities?
- Who are the teachers and related service providers who serve students with disabilities?
- How are special education teaching assistants used to serve students with disabilities?
- What are we spending on special education services in different types of schools?
- How does special education spending vary across states classified by funding formula, student poverty, special education enrollment levels, and income levels?

One of the SEEP reports will also be devoted to describing the purpose and design of the study.

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Abbreviations

SLD	Specific Learning Disability
SLI	Speech/Language Impairment
ED	Emotional Disturbance
OI	Orthopedic Impairment
MR	Mental Retardation
HI/D	Hearing Impairment/Deafness
TBI	Traumatic Brain Injury
AUT	Autism
VI/B	Visual Impairment/Blindness
MD	Multiple Disabilities
OHI	Other Health Impairment
PRE	Preschool Students
NPS	Students placed in non-public schools or other public agencies paid for by the public school district

Highlights

- **Total expenditure on specialized equipment.** During the 1999-2000 school year, \$465,349,332 was spent on specialized equipment in the U.S. This accounts for 0.9 percent of total special education spending and 0.6 percent of the total regular and special education spending used to educate special education students.
- **Basic materials account for the majority of specialized equipment used in special education services.** The most frequently used specialized equipment items are basic materials like calculators, desktop computers, and tape recorders. This is true across all primary disability categories and age groups.
- **Total per pupil expenditure on specialized equipment on students served within public schools.** The total average per pupil expenditure on specialized equipment for students served by special education programs in 1999-2000 was \$79. When we include only the special education students who use specialized equipment, the average expenditure is \$122 per student.
- **Patterns in expenditures on specialized equipment.** Mobility equipment accounted for the highest specialized equipment expenditures both in terms of per pupil expenditure and total expenditure. Per pupil expenditures were higher for students with low-incidence disabilities.

I. Introduction

The first report in this series (Chambers, Parrish, & Harr, 2002) presented information derived from the Special Education Expenditure Project (SEEP) on the total expenditures used to educate students found eligible for special education services. Subsequent reports have examined variations in spending by district and by disability category. However, these reports have focused on the total dollar amount used to educate special education students, a figure composed primarily of personnel expenditures. In 1999-2000, non-personnel spending on instructional and related services in special education programs amounted to \$1.4 billion, or 2.8 percent of the \$50 billion in special education spending to educate students with disabilities.¹

This report explores one component of special education's non-personnel expenditures: specialized equipment. Specialized equipment plays an important role in improving the quality of education provided to students with disabilities. In addition to providing these students with greater independence and access to their environment, specialized equipment also helps students with disabilities learn valuable skills that may not otherwise be possible due to the students' functional limitations.

Specialized equipment is a fairly broad and inclusive category of items. According to the Individuals with Disabilities Education Act (IDEA) of 1997 (P.L. 101-476), the term includes any item that is necessary for the functioning of a particular facility that provides educational services. An important subcategory of specialized equipment is assistive technology, which is defined by the IDEA as "any item, piece of equipment or product system, whether acquired commercially or off the shelf, modified, or customized, that is used to increase, maintain, or improve the functional capabilities of individuals with disabilities."

Assistive technology has received considerable attention in recent government legislation for students with disabilities. The IDEA mandates that all Individualized Education Programs (IEPs) consider whether a student would benefit from assistive technology. It also specifies that all educational agencies must provide or pay for any assistive technology devices or services that are considered necessary for ensuring a free appropriate public education to children with disabilities. In addition to the IDEA, other federal laws have provided for the inclusion of specialized equipment and assistive technology in public schools. The Technology-Related Assistance for Individuals with Disabilities Act (P.L. 100-407) provides financial assistance to states to provide assistive technology services to their students. The Assistive Technology Act of 1998 (P.L. 105-394) provides federal funding for state assistive technology programs. Given the increased importance of assistive technology in the education of students with

¹ According to Chambers, J., Parrish, T., and Harr, J. (2002), "*special education spending* includes amounts used to employ special education teachers, related service providers, and special education administrators, as well as spending on special transportation services and non-personnel items (e.g., materials, supplies, technological supports)." See Table B-1 from the Appendices of Chambers, J., Parrish, T., and Harr, J. (2002) for the amounts used on non-personnel expenditures.

disabilities, it is useful to know the expenditures associated with providing this equipment to students.

SEEP examines the nation's spending on special education and related services by using data obtained through a questionnaire that was administered in 1999-2000.² The questionnaires were completed by special education teachers and related service providers about their special education students. Past SEEP reports have used these data to estimate the total expenditure on students with disabilities (Chambers, Parrish, Harr 2000) and the variation in expenditure by disability category (Chambers, Parrish, Shkolnik, Pérez 2002). When calculating total expenditures, both reports assigned a fixed ratio of personnel to non-personnel expenditures, which includes specialized equipment.³

This report provides a more in-depth look at the expenditure on specialized equipment for students with disabilities. Section II shows the most commonly used specialized equipment items used in the nation, as well as the variations in the use of specialized equipment by primary disability category and age group. Section III presents an analysis of the total expenditure on specialized equipment by type of equipment used and disability category. The summary and conclusions of this report are found in Section IV.

This report does not include students placed in non-public schools or other public agencies paid for by the public school district.⁴ We do report on specialized equipment for each of the 13 disability categories and an additional category—preschool students. These students are shown separately because there were not enough students to be broken out by disability category. Unless otherwise specified, students have been classified by their primary disability category.

² See Appendix A for more information about the sampling

³ This ratio does not vary by disability categories.

⁴ For special education students served in non-public schools or other public agencies, SEEP was able to collect information on the tuition paid but not on the specific instructional and related services the students received. Therefore, data regarding specialized equipment was not available for these students.

II. Description of Specialized Equipment Items Used in Special Education Programs

We first examine the types of specialized equipment used by students served by special education programs in the United States. By taking a broad look at special education students and then breaking them down by disability and age group, we will describe the specialized equipment items and the types of specialized equipment used most commonly in special education.

The original SEEP survey lists 120 pieces of equipment used by students that receive special education services. The items on this list range from simple equipment like calculators and mats to more complex equipment like sip-and-puff Morse code switches and automatic page-turners. These 120 items have been divided into seven general categories by purpose and use: mobility equipment, communication devices, vision aids, health and hygiene, computer access equipment, recreation, and basic materials.⁵ Exhibit 1 lists the ten specialized equipment items most frequently used in special education.

Exhibit 1: Top Ten Specialized Equipment Items

Item	Equipment Category	Sample Size	Population	Percentage of students that use the item
Calculator	Basic Materials	3,974	2,313,235	37.4%
Computer (desktop)	Basic Materials	3,835	1,964,887	31.7%
Tape recorder	Basic Materials	1,767	1,121,350	18.1%
Printer (laser)	Basic Materials	1,278	709,306	11.5%
Word processor	Basic Materials	1,143	685,021	11.1%
Mirror	Communication Devices	535	470,733	7.6%
Printer	Basic Materials	892	398,323	6.4%
Books on tape	Vision Aids	610	229,815	3.7%
Therapy balls	Mobility Equipment	510	188,608	3.0%
Auditory training system	Communication Devices	252	157,673	2.5%

Exhibit 1 reads: Calculators are the most frequently used specialized equipment item, used by 37.4 percent of students in special education. Calculators are grouped in the basic materials equipment category.

⁵ Please see Appendix B for a complete list of the specialized equipment items and the categories to which each item has been assigned.

The most commonly used specialized equipment items in special education fall into the basic materials category. As Exhibit 1 demonstrates, calculators, desktop computers, tape recorders, and printers are used by the largest numbers of special education students.⁶ It is interesting to note that most of these top ten items are items one might expect to find in a mainstream classroom; in addition to basic materials, tape recorders and books on tape are familiar equipment for most of the population. More expensive equipment items that are frequently used by low-incidence disabilities are not found on this list. Furthermore, most of the items on this list, particularly computer-related equipment, are shared among many students, meaning that their cost is dispersed.

As shown in Exhibit 2, when we remove basic materials from the list, the most commonly used specialized equipment items are communication devices, mobility and positioning equipment, and recreation equipment. Again, it should be noted that the most frequently used equipment items are relatively commonplace. Because students with low-incidence disabilities compose less than 20 percent of all students receiving special education services, it makes sense that highly specialized and targeted equipment items are not commonly used in the total population. Nevertheless, it is noteworthy that the most common items are everyday equipment.

Exhibit 2: Top Ten Specialized Equipment Items (Not Including Basic Materials)

Item	Equipment Category	Sample Size	Population	Percentage of students that use the item
Mirror	Communication Devices	535	470,733	7.6%
Books on tape	Vision Aids	610	229,815	3.7%
Therapy balls	Mobility Equipment	510	188,608	3.0%
Auditory training system	Communication Devices	252	157,673	2.5%
Wheelchair	Mobility Equipment	502	150,116	2.4%
Adaptive sitting	Mobility Equipment	366	133,395	2.2%
Microphone	Communication Devices	133	131,243	2.1%
Play equipment	Recreation	326	122,624	2.0%
Mat	Mobility Equipment	338	109,665	1.8%
Tricycle	Recreation	236	98,013	1.6%

Exhibit 2 reads: Excluding basic materials, mirrors are the most frequently used specialized equipment item, used by 7.6 percent of students in special education. Mirrors are grouped in the communication devices equipment category.

⁶ Because some disabilities were oversampled in this study, the population represented in this table may not always be proportional to the sample size. All students were weighted according to their national population, and the population estimate reflects this weighting. Details on sampling can be found in Appendix A.

The fact that basic materials account for the vast majority of specialized equipment used in special education is underlined repeatedly in this section of the report. Mobility equipment, communication devices, vision aids, and recreation are also relatively common. As Exhibit 2 indicates, and Exhibits 3 and 4 will further demonstrate, computer access and health and hygiene equipment are not used frequently by any segment of the special education population.

Variation in Specialized Equipment Use by Primary Disability Category

This section examines the use of specialized equipment items by primary disability category. As was seen in Exhibit 1, the majority of specialized equipment items within each primary disability are in the basic materials category.⁷ In particular, desktop computers (one of the three most common items for all 14 disability categories), calculators (in the top three in 12 disability categories), and tape recorders (in the top three in seven disability categories) were used frequently in many of the disability categories. However, there is some variation among the categories. Disabilities characterized by impaired communication (for example, speech/language impairment and hearing impairment/deafness) frequently have communication devices among their top specialized equipment items. Nearly half (46.7 percent) of the students with an orthopedic impairment use wheelchairs. The overall pattern, though, is that at least two of the three most common items for every disability are basic materials.

Exhibit 3, below, provides a better sense of the trends within and across disabilities by ranking the three most common specialized equipment items within each disability category by frequency, but without including basic materials. Deaf-blindness and developmental delay disability categories are included in this exhibit but not in the rest of the report due to insufficient sample size to report expenditure estimates.

⁷ See Appendix C for the table listing the most frequently used specialized equipment items by disability, including basic materials.

Exhibit 3: Top Three Specialized Equipment Items Used By Disability Category (Not Including Basic Materials)

	Equipment Category	Sample Size	Population	Percentage of Total Population
Specific Learning Disability (Population=2,807,268)				
Books on tape	Vision Aids	141	104,162	3.7%
Slant board	Mobility Equipment	10	36,314	1.3%
Auditory training system	Communication Devices	22	29,098	1.0%
Speech/Language Impairment (Population=1,076,182)				
Mirror	Communication Devices	144	272,175	25.3%
Microphone	Communication Devices	24	73,237	6.8%
Auditory training system	Communication Devices	19	70,733	6.6%
Emotional Disturbance (Population=383,418)				
Books on tape	Vision Aids	28	11,513	3.0%
Radio/TV amplifiers	Communication Devices	12	4,176	1.1%
Large print books	Vision Aids	3	2,408	0.6%
Orthopedic Impairment (Population=66,110)				
Wheelchair	Mobility Equipment	113	30,877	46.7%
Walker	Mobility Equipment	37	12,955	19.6%
Toileting equipment	Health and Hygiene	36	7,607	11.5%
Mental Retardation (Population=565,281)				
Mirror	Communication Devices	56	39,363	7.0%
Communication book	Communication Devices	39	33,648	6.0%
Therapy balls	Mobility Equipment	49	29,739	5.3%
Hearing Impairment/Deafness (Population=59,240)				
Auditory training system	Communication Devices	119	19,692	33.2%
Phonic ears	Communication Devices	47	10,740	18.1%
Microphone	Communication Devices	35	3,468	5.9%
Traumatic Brain Injury (Population=12,073)				
Wheelchair	Mobility Equipment	16	2,071	17.2%
Books on tape	Vision Aids	17	815	6.7%
Walker	Mobility Equipment	5	665	5.5%
Autism (Population=55,042)				
Play equipment	Recreation	44	6,098	11.1%
Communication board	Communication Devices	67	4,965	9.0%
Auditory training system	Communication Devices	10	4,925	8.9%
Visual Impairment (Population=22,241)				
Books on tape	Vision Aids	63	8,138	36.6%
Magnifier	Vision Aids	47	6,456	29.0%
Large print books	Vision Aids	78	6,093	27.4%
Multiple Disabilities (Population=78,993)				
Wheelchair	Mobility Equipment	174	20,163	25.5%
Adaptive sitting	Mobility Equipment	126	12,432	15.7%
Mat	Mobility Equipment	124	11,416	14.5%
Other Health Impairments (Population=238,975)				
Wheelchair	Mobility Equipment	40	21,156	8.9%
Books on tape	Vision Aids	49	9,969	4.2%
Therapy balls	Mobility Equipment	35	8,993	3.8%
Preschool (Population=539,399)				
Mirror	Communication Devices	119	109,667	20.3%
Therapy balls	Mobility Equipment	132	109,331	20.3%
Play equipment	Recreation	116	88,553	16.4%
Deaf-Blindness (Population=1,010)				
Auditory training system	Communication Devices	4	231	22.8%
Magnifier	Vision Aids	5	131	12.9%
Large print books	Vision Aids	4	98	9.7%
Developmental Delay (Population=18,727)				
Mirror	Communication Devices	11	6,046	32.3%
Adaptative play equipment	Recreation	9	1,067	5.7%
Large print books	Vision Aids	4	961	5.1%

Exhibit 3 shows that substantial variation exists within many of the disability categories. For many disability categories, the most frequently used items are used by a small percentage of the students with the given disability. In other words, there are no items that one could consider standard equipment for that disability; it appears that these students use a variety of items. For example, while books on tape are the most frequently used equipment by students with a specific learning disability, only 3.7 percent of these students use this item. Only 1.3 percent and 1.0 percent of this population use the second and third most frequently used items, respectively. In particular, the four “high-incidence” disabilities show evidence of substantial variation.⁸ With the exception of mirrors used for speech/language impairment (used by 25.3 percent of students), no single item is used by more than 7 percent of students within any high-incidence disability. Because high-incidence disabilities are characterized by a variation in individual needs, it is not surprising to find a breadth of specialized equipment for these students.

Exhibit 3 also provides evidence of patterns across disability categories. Communication devices were among the most commonly used specialized equipment items for speech/language impairment, mental retardation, hearing impairment/deafness, and autism. Because these disabilities are associated with difficulty in communication, one might expect such results. Similarly, vision aids were among the most commonly used specialized equipment items for visual impairment and deaf-blindness, and two of the three most frequently used items within emotional disturbance were also vision aids. Finally, at least two of the three most prevalent items for orthopedic impairment, traumatic brain injury, multiple disabilities, and other health impairments were in the mobility equipment category. The mobility needs for students with orthopedic impairments or traumatic brain injury explains the appearance of mobility equipment on this list. The inclusion of these items on the lists of multiple disabilities and other health impairments may suggest that students who fall into one of these categories often have mobility needs that must be addressed in the classroom.

Some specific specialized equipment items were common across many different disability categories. Mirrors were the item most frequently used by students with speech/language impairment, mental retardation, developmental delay, and those in preschool. Wheelchairs were the item most frequently used by students with orthopedic impairment, traumatic brain injury, multiple disabilities, and other health impairments. Books on tape and auditory training system were commonly used in the greatest number of disability categories, appearing in the top three for five different disabilities. Large-print books were among the three most frequently used items for four different disabilities.

⁸ Four of the 13 primary disability categories (i.e., specific learning disability, speech/language impairment, mental retardation, and emotional disturbance) account for well over 80 percent of school-aged special education students. These are referred to as “high-incidence” disabilities since they represent the largest percentages of the special education population. (Chambers, Parrish, and Harr, 2002). The remaining eight disability categories are referred to as “low-incidence” disabilities.

Variation in Specialized Equipment Use by Age Group

We next examine the most commonly used specialized equipment items by age group. Students are broken into the age groups used by the Office of Special Education Programs (OSEP): preschool, ages 6 to 11, ages 12 to 17, and ages 18 to 22.

In a list of the five most common specialized equipment items by age group (Exhibit 4), basic materials once again dominate the list.⁹ The top five items for ages 12 to 17 and 18 to 22 are all basic materials. For students aged 6 to 11, only one of the five most frequently used items, a mirror, is not in the category of basic materials. Preschool students are the only group that uses items that are not considered basic materials with enough frequency to place those items in the top five for that age group. Mirrors, therapy balls, and play equipment are the third, fourth, and fifth most commonly used specialized equipment items, respectively, among preschool students.

Some patterns are more visible without the inclusion of items that fall into the basic materials category. Exhibit 4 lists the five most frequently used specialized equipment items by age group, not including basic materials.

⁹ See Appendix D for a table that lists the most frequently used specialized equipment items by age group, including basic materials.

Exhibit 4: Top Five Specialized Equipment Items Used By Age Group (Not Including Basic Materials)

	Equipment Category	Sample Size	Population	Percentage of Total Population
Preschool (Population=539,399)				
Mirror	Communication Devices	119	109,667	20.3%
Therapy balls	Mobility Equipment	132	109,331	20.3%
Play equipment	Recreation	116	88,553	16.4%
Tricycle	Recreation	112	82,047	15.2%
Adaptive sitting	Mobility Equipment	84	66,944	12.4%
Ages 6 to 11 (Population=2,495,436)				
Mirror	Communication Devices	345	313,508	12.6%
Books on tape	Vision Aids	287	109,781	4.4%
Auditory training system	Communication Devices	157	100,184	4.0%
Microphone	Communication Devices	74	75,294	3.0%
Therapy balls	Mobility Equipment	277	59,277	2.4%
Ages 12 to 17 (Population=2,573,743)				
Books on tape	Vision Aids	240	64,075	2.5%
Wheelchair	Mobility Equipment	182	58,342	2.3%
Mirror	Communication Devices	61	41,968	1.6%
Auditory training system	Communication Devices	75	39,556	1.5%
Radio/TV amplifiers	Communication Devices	48	38,656	1.5%
Ages 18 to 22 (Population=315,381)				
Wheelchair	Mobility Equipment	66	23,761	7.5%
Toileting equipment	Health and Hygiene	16	11,284	3.6%
Books on tape	Vision Aids	37	11,193	3.5%
Large print books	Vision Aids	17	8,484	2.7%
Adaptive sitting	Mobility Equipment	26	6,990	2.2%

The top items for preschool students appear to be relatively common; one out of every five preschool students uses a mirror, and the same percentage use therapy balls. In contrast, the other three age groups demonstrate substantial variation. With two exceptions (12.6 percent of students ages 6 to 11 use a mirror, and 7.5 percent of students ages 18 to 22 use a wheelchair), no single specialized equipment item is used by even 5 percent of the students in any of these three age groups.

Even with the low frequency of many specialized equipment items, some similarity does appear between the 6 to 11 age group and the 12 to 17 age group. Three of the five most commonly used items for both age groups are communication devices. In addition, books on tape are one of the top two items for both age groups. No such similarities are evident between preschool students and students between the ages of 18 and 22.

Two specialized equipment items are frequently used by students in three different age groups. Mirrors top the list for preschool students and students aged 6 to 11, and are the third most commonly used item for students aged 12 to 17. Books on tape are among the top three most commonly used items for the three oldest age groups.

III. Total Expenditures on Specialized Equipment in the U.S. (1999-2000)

We now turn our attention to expenditures on specialized equipment in the United States. We will examine how much was spent on specialized equipment during the 1999-2000 school year, and how that expenditure varies by equipment category and disability category.

Approximately \$465,349,332 was spent on specialized equipment in the U.S. in 1999-2000, an average of \$79 per student served by special education programs.¹⁰ As Exhibit 5 demonstrates, this accounts for 0.9 percent of all *special education* expenditures for the 1999-2000 school year. When we consider the *total* expenditure for educating students with disabilities (including special education and general education expenditures), specialized equipment accounts for 0.6 percent of the amount spent in 1999-2000.¹¹

Exhibit 5: Total Specialized Equipment Spending as a Percentage of Total Special Education Spending, 1999-2000

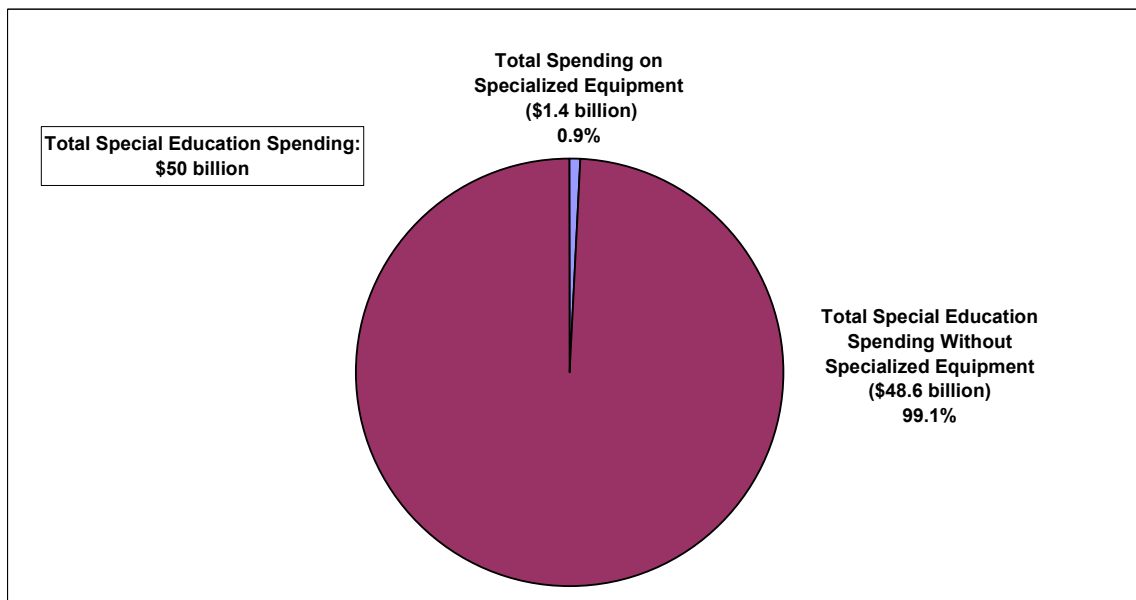


Exhibit 5 reads: Specialized equipment accounts for 0.9 percent of the \$50 billion in annual special education expenditures for educating students with disabilities.

¹⁰ Please see Appendix E for more information on how the pricing of specialized equipment was conducted. Note that Appendix E lists the per pupil expenditure on specialized equipment as \$122. This calculation was done only for students who used specialized equipment. The average expenditure for *all* students in special education (including those who did not use specialized equipment) is \$79.

¹¹ Differences between special education expenditures and total education expenditures are discussed in detail in Chambers, Parrish, and Harr (2002).

Variation in Specialized Equipment Expenditures by Equipment Category

The purpose of this section is to better understand the nation's spending patterns on specialized equipment items that are similar in use and purpose. As mentioned earlier, the 120 specialized equipment items were divided into seven general categories: mobility equipment, communication devices, vision aids, health and hygiene, computer access equipment, recreation, and basic materials.¹² The total expenditure on each category of specialized equipment is presented in Exhibit 6.

Exhibit 6: Total Expenditure On The Different Categories Of Specialized Equipment

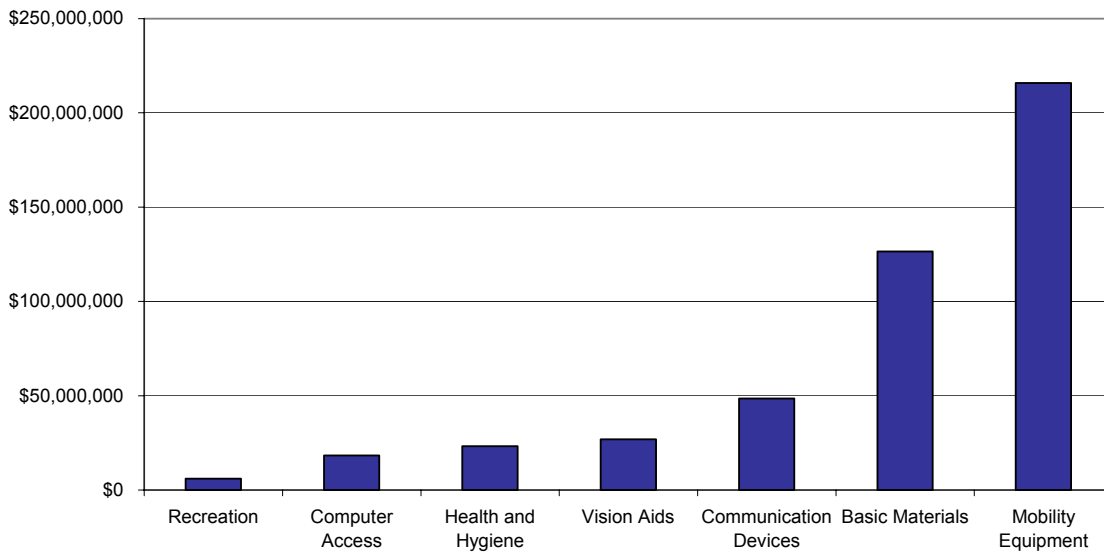


Exhibit 6 reads: The total expenditure on mobility equipment was approximately \$215,000,000, which was the greatest amount spent on any category of specialized equipment in the 1999-2000 school year.

Recreation, computer access, health and hygiene equipment, and vision aids all have very low total expenditures. The combined total expenditure on these four categories is approximately one-third of the amount spent on mobility equipment alone. Communication devices, basic materials, and mobility equipment are the three categories of specialized equipment with the highest expenditure. Looking back to Exhibits 1 and 2 show that they are also the three categories that are most often used by students who receive special education.

The two categories that absorb a particularly large percentage of the total expenditure are basic materials and mobility equipment. Basic materials account for approximately 27

¹² Please see Appendix B for a list of the items that were assigned to each category.

percent of total expenditures; given that basic materials were the most commonly used category of equipment items overall, by disability, and by age group, it would be expected that the total expenditure on this category would be substantial. Mobility equipment, on the other hand, was commonly used only by a select group of students with low-incidence disabilities (students with multiple disabilities, orthopedic impairments, and traumatic brain injury). Despite the fact that only low-incidence disabilities rely heavily on mobility equipment, the national expenditure on mobility equipment is almost half (46 percent) of the total expenditure on specialized equipment.

In Exhibits 3 and 4, we saw that communication devices were commonly used across many segments of the special education population. In particular, they were frequently used in the disability categories of speech/language impairment, mental retardation, hearing impairment/ deafness, and autism. They were also commonly used in the 6 to 11 and 12 to 17 age groups. Thus, part of the high expenditure on communication devices can be explained by the relative frequency of their use in special education.

The total expenditure on the categories of specialized equipment is perhaps more telling when put in the context of the number of students that use the items from each equipment category. Exhibit 7 presents the average total per pupil expenditure for the different categories of specialized equipment. These figures were calculated by dividing the total expenditure on each category of specialized equipment by the number of students that use any of the items within each equipment category.

Exhibit 7: Average Per Pupil Expenditure On The Different Categories Of Specialized Equipment

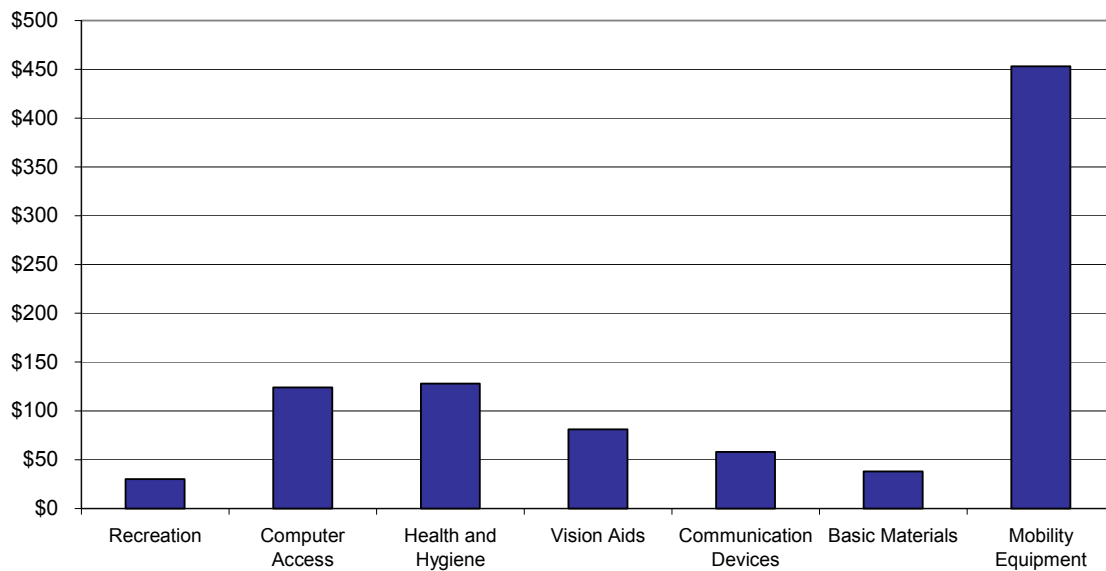


Exhibit 7 reads: The average expenditure on mobility equipment for students who used mobility equipment in the 1999-2000 school year was \$453.

Just as Exhibit 6 showed mobility equipment as having the highest total expenditure, Exhibit 7 shows mobility equipment as also being the most expensive category in terms of total per pupil expenditure. The average expenditure for a student that uses mobility equipment is \$453, almost four times the average expenditure for the next most expensive category, health and hygiene equipment.

Although the total expenditure on basic materials was one of the highest of all the equipment categories, the average per pupil expenditure on basic materials is one of the lowest at \$38 per student. This can be attributed in part to the fact that a large number of students use basic materials items, which means the total expenditure is spread out over many students. A similar situation is seen in communication devices. The total expenditure on communication devices was fairly high, but the per pupil expenditure is fairly low because of the large number of students that use items in this category. This situation contrasts to what we see in the computer access and health and hygiene categories, where the total expenditure is very small. However, since very few students use these equipment items, the average per pupil cost in both categories is fairly high at approximately \$126.

Variation in Specialized Equipment Expenditures by Student Needs

By Disability Category

An alternate way to look at the nation's expenditure on specialized equipment is to examine how much schools are spending on specialized equipment based on students' primary disabilities. Exhibit 8 presents the average per pupil expenditure on specialized equipment by primary disability category. As mentioned before, preschool students are included in a separate category due to insufficient sample size when divided into disability categories. Expenditure estimates for students with developmental delay and deaf-blindness are not included in this report.¹³

¹³ Expenditure estimates for students with deaf-blindness are not shown due to insufficient sample size. OSEP requires a minimum sample size for reporting of 30 students. Only a small sample of school-aged children was classified with developmental delay (i.e., less than 45), which could be attributed to the fact that this category was used in only 21 states. Furthermore, there was wide variation in the numbers and proportions of school-aged children classified as developmentally delayed across the states. Because of the apparent lack of consistency of use of this category combined with the small sample, expenditure estimates for this population of children are also omitted from this report.

Exhibit 8: Average Per Pupil Expenditure On Specialized Equipment By Primary Disability Category

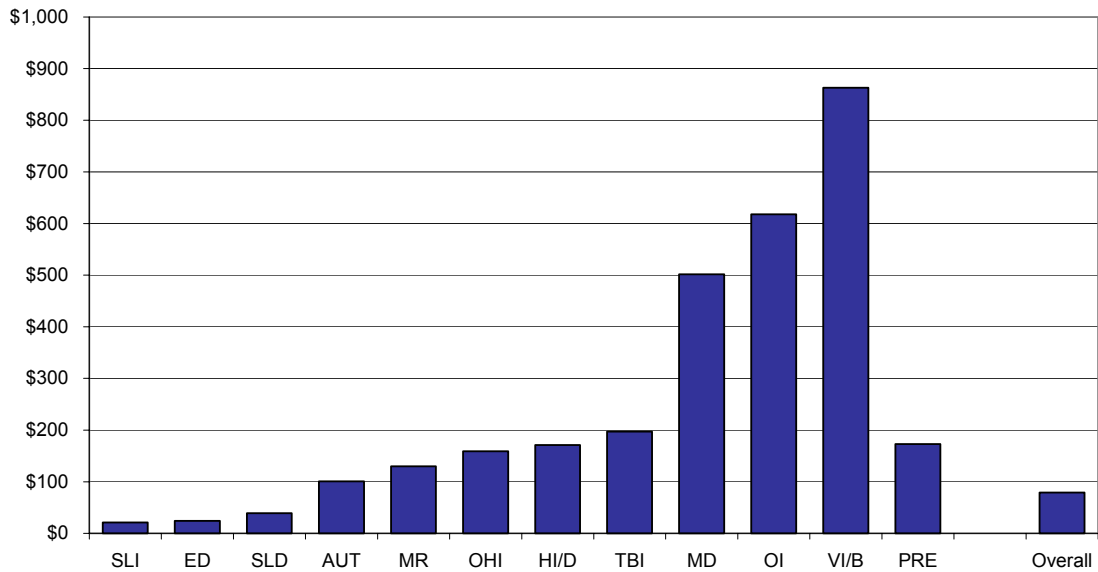


Exhibit 8 reads: On average, a student with Visual Impairment/Blindness (VI/B) spends approximately \$863 per year on specialized equipment.

The total per pupil expenditure on specialized equipment for students served within public schools is \$79, less than one percent of the total expenditure to educate a special education student.¹⁴ As shown in Exhibit 8, this amount varies significantly across disability categories, and many of the categories have expenditure amounts much higher than \$79.¹⁵ This \$79 figure (the average amount across all categories) is low relative to many of the individual categories because four of the five disabilities with the lowest expenditures are high-incidence disabilities (speech/language impairment, emotional disturbance, specific learning disability, and mental retardation); students with high-incidence disabilities account for over 80 percent of the school aged special education population, bringing the average down.

Students seem to form two distinct groups in terms of their average per pupil expenditure on specialized equipment. Multiple disabilities, orthopedic impairment, and visual impairment/blindness have the highest expenditure on specialized equipment, ranging from \$502 (multiple disabilities) to \$863 (visual impairment/ blindness) per student.

¹⁴ As discussed in Chambers, Shkolnik, and Pérez (2003), the total per pupil expenditure to educate a special education student is \$12,525. If students placed in non public schools or other public agencies are excluded from the estimation, the total per pupil expenditure is \$12,019.

¹⁵ The total per pupil expenditure on specialized equipment listed in Appendix E is \$122, which is higher than the figure reported in Exhibit 8. The reason for the discrepancy is that the \$122 amount only includes students who received specialized equipment services, while the \$79 figure includes all students served by special education services.

Referring back to Exhibit 3, we see that it is common for students with an orthopedic impairment or multiple disabilities to use mobility equipment, which is the most expensive category of specialized equipment in terms of per pupil and total expenditure (see Exhibit 7). This could explain the relatively high per pupil expenditure in these two categories.

Students with high-incidence disabilities, autism, other health impairments, hearing impairment/deafness, or traumatic brain injury fall into another group; these students spend noticeably less on specialized equipment, ranging from \$21 (speech/language impairment) to \$197 (traumatic brain injury). Another look at Exhibit 3 shows us that, with the exception of traumatic brain injury, students with these disabilities most frequently use communication devices, which, as Exhibit 7 shows, is a significantly less expensive category in terms of per pupil expenditure than mobility equipment. The traumatic brain injury category most frequently uses mobility equipment and also has the highest per pupil expenditure of these categories, which is consistent with the pattern.

It may seem unusual that students with visual impairment/blindness have the highest average per pupil expenditure on specialized equipment, given that Exhibit 8 shows us that the average per pupil expenditure on vision aids is only \$81. The answer is seen when one looks at the average expenditure on vision aids by disability category. On average, students with visual impairment/blindness spend \$835 on vision aids, whereas students that fall into any other primary disability category spend an average of \$41 on vision aids. The large number of students in other primary disability categories causes the average expenditure on vision aids seen in Exhibit 7 to be very low. This type of issue is further explored in Exhibit 9, which shows the percentage of the average per pupil expenditure on specialized equipment that is spent on the categories of specialized equipment by primary disability category.

Exhibit 9: Percentage of the Average Per Pupil Expenditure Spent on Categories of Specialized Equipment, By Disability Category 1999-2000

Disability Categories	Categories of Specialized Equipment							Average Per Pupil Expenditure on Specialized Equipment
	Mobility Equipment	Communication Devices	Vision Aids	Health and Hygiene	Computer Access	Recreation	Basic Materials	
Specific Learning Disability	30.2%	7.7%	3.8%	0.4%	2.3%	0.1%	54.5%	\$38
Speech/Language Impairment	7.7%	26.5%	0.3%	0.6%	0.0%	0.2%	67.0%	\$22
Emotional Disturbance	1.5%	1.2%	1.4%	0.0%	1.3%	0.0%	95.0%	\$23
Orthopedic Impairment	74.1%	5.4%	0.7%	5.2%	3.3%	0.5%	10.9%	\$617
Mental Retardation	49.7%	8.7%	3.4%	8.5%	4.6%	1.2%	24.2%	\$130
Hearing Impairment/Deafness	29.1%	57.5%	2.0%	0.7%	0.1%	0.3%	10.0%	\$169
Traumatic Brain Injury	73.6%	2.3%	1.2%	3.3%	4.8%	0.8%	13.8%	\$198
Autism	15.8%	43.2%	3.9%	5.0%	6.5%	3.3%	22.0%	\$101
Visual Impairment/Blindness	16.3%	5.0%	71.1%	0.0%	0.1%	0.3%	7.2%	\$861
Multiple Disabilities	57.3%	16.7%	3.9%	3.5%	6.5%	0.9%	11.2%	\$503
Other Health Impairments	55.1%	8.8%	3.7%	6.5%	5.8%	0.6%	19.6%	\$159
Preschool	65.2%	6.4%	2.8%	10.6%	6.0%	4.2%	5.1%	\$173

Exhibit 9 reads: A student with autism typically spends approximately \$101 on specialized equipment. Of this amount, 15.8 percent is spent on mobility equipment.

Across all disability categories, the tendency is for the per pupil expenditure on specialized equipment to be concentrated in one or two equipment categories. The most extreme example of this is students with emotional disturbance, for whom 95 percent of the expenditure on specialized equipment is on basic materials. Other examples are students with traumatic brain injury and orthopedic impairments, on both of whom approximately 70 percent of the expenditure is on mobility equipment. As noted earlier, students with visual impairments/blindness spend approximately \$861 on specialized equipment, and 71 percent of this amount is spent on vision aids.¹⁶

Exhibit 9 also illustrates the clear distinction between low- and high-incidence disabilities in terms of the categories in which the majority of the per pupil expenditure on

¹⁶The average per pupil expenditure on vision aids for students with vision impairments/blindness who use vision aids is \$835. When students with vision impairments/blindness who do not use vision aids are included in the calculation, the average per pupil expenditure on vision aids is approximately \$613, which is 71.1 percent of \$861.

specialized equipment is spent. Three of the four high-incidence disabilities (specific learning disability, speech/language impairment, and emotional disturbance) spent over 50 percent of their average per pupil expenditure on specialized equipment on basic materials. The fourth high-incidence disability, mental retardation, spent 24.2 percent of the average per pupil expenditure on basic materials, but this is secondary to the 49.7 percent that was spent on mobility equipment. The large expenditure on basic materials by low-incidence disabilities is consistent with the findings in Exhibit 3, which showed that basic materials were used by a very large percentage of students with high-incidence disabilities and none of the other categories of specialized equipment were comparable in their frequency of use.

On the other hand, while low-incidence disability categories also spent a portion of their expenditure on basic materials (ranging from 7 to 22 percent), the primary focus of their spending was on mobility equipment. Four of the low-incidence disability categories (orthopedic impairment, traumatic brain injury, multiple disabilities, and other health impairments) used over 50 percent of their per pupil expenditure on specialized equipment for mobility equipment. Once again, these patterns parallel the earlier findings in Exhibit 3, which showed that two of the three most frequently used equipment items for these same four disability categories.¹⁷

¹⁷ This is true when basic equipment is not included in the analysis.

IV. Conclusions

Specialized equipment refers to items that provide disabled children with greater independence and access to their environment. The provision of specialized equipment to students in special education programs has been mandated by the IDEA and subsequent legislation, and therefore it plays a significant role in national special education expenditures. During the 1999-2000 school year, the nation spent \$465,349,332 on specialized equipment. This accounts for 0.9% of the \$50 billion spent on special education services, and 0.6% of the \$77.3 billion spent on regular and special education services for students with disabilities. The average per pupil expenditure on specialized equipment was \$79.

Basic materials account for the majority of specialized equipment used in our nation's public schools. Across all disability categories and age groups, items such as calculators, desktop computers, and tape recorders are the most frequently used specialized equipment. In terms of expenditure, basic materials account for a large portion of the nation's total expenditure on specialized equipment; however, the per pupil expenditure is relatively low due to the large number of students that use this type of specialized equipment. In particular, the four "high-incidence" disabilities tend to use a large portion of their expenditure on basic materials and exhibit great variation in their use of other specialized equipment items that are not basic materials.

Communication devices, which are also associated with relatively low per pupil expenditures, are another commonly used category of specialized equipment for students with speech/ language impairment, hearing impairment/deafness, and autism. As a result, students with these disabilities tend to have relatively low total expenditures on specialized equipment. On the other hand, students with orthopedic impairments, traumatic brain injury, multiple disabilities, and other health impairments primarily use mobility equipment items, which is the category associated with the highest per pupil expenditure. These students, especially those with orthopedic impairments and multiple disabilities, have very high per pupil total expenditure on specialized equipment.

This report has demonstrated that basic materials account for the majority of specialized equipment in special education. However, the expenditure on specialized equipment varies greatly depending on the needs of the student and the type of equipment used. Students that use equipment such as basic materials and communication devices tend to be associated with lower expenditures on specialized equipment. Students that frequently use mobility equipment tend to have higher expenditure on specialized equipment.

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Appendix A

SEEP Samples

The SEEP surveys were sent to a stratified random sample of districts and schools (see “SEEP Reports”) that included representatives from the 50 states and the District of Columbia. Samples of school districts were selected within each of the states (a minimum of two districts in each state, except for Hawaii and the District of Columbia, which have only one school district each). Samples from larger states included more districts. Intermediate education units (IEUs) were selected from among IEUs serving the districts included in the sample. IEUs were surveyed only if they received funds directly from the state for serving their students and essentially operated independently of the school districts in the region they serve.

Samples of elementary, secondary, and special education schools were selected from among the sampled districts and IEUs (where appropriate). In addition, state special education schools were also sampled.

Expanded samples of districts, IEUs, and schools were also selected through a series of nine separate contracts with individual states.¹⁸ These states provided additional support for data collection, and these expanded samples are included in the analyses presented in these reports.

Data were collected from all special education teachers and related service providers assigned to the schools in the sample. In addition, samples of regular education teachers and special education teacher aides were selected from the staff in these schools.

Finally, the special education teachers and related service providers were each asked to select a sample of two students with disabilities from the rosters of students they serve. To prevent the possibility of a student being selected multiple times, the research team developed sample selection procedures so that students were only selected from the most restrictive placement possible for any given student. The sample selection procedures were designed to ensure that the service provider most knowledgeable about any student completed the survey about the student.

The student sample on which many of the analyses are based comes from 1,053 of the 1,767 schools included in our original sample (representing 45 states and the District of Columbia). This sample includes 330 regular local educational agencies, 14 IEUs, and 7 state special education schools. Analysis of the patterns of response suggests that the samples on which these estimates are based do not appear to exhibit any response bias.

¹⁸These nine states include Alabama, Delaware, Indiana, Kansas, Missouri, New Jersey, New York, Ohio, and Rhode Island.

Appendix B

Categories of Specialized Equipment

The list below includes all specialized equipment items used for this report, as listed in the SEEP survey, as well as the equipment categories to which each item has been assigned.

Specialized Equipment Item	Equipment Category
Calculator	Basic Materials
Camcorder	Basic Materials
Computer-desktop	Basic Materials
Laptop	Basic Materials
Printer	Basic Materials
Laser Printer	Basic Materials
Tape recorder	Basic Materials
Typewriter	Basic Materials
Adjustable tables	Basic Materials
Lap table	Basic Materials
Raised workstations	Basic Materials
Word processor	Basic Materials
Other basic materials	Basic Materials
Auditory training system	Communication Devices
Microphone	Communication Devices
Mirror	Communication Devices
Phonic ears	Communication Devices
Radio/TV amplifiers	Communication Devices
Speech recognition	Communication Devices
Video voice analyzer	Communication Devices
Vocal aid	Communication Devices
Other speech and language equipment	Communication Devices
Adaptive sitting	Mobility Equipment
Arm or leg ergonometer	Mobility Equipment
Gait trainers	Mobility Equipment
Mulholland chair	Mobility Equipment
Multi functional positioning system	Mobility Equipment
Prone stander	Mobility Equipment
Tandem bike	Mobility Equipment
Walker	Mobility Equipment
Weights	Mobility Equipment
Therapy balls	Mobility Equipment
Other physical therapy equipment	Mobility Equipment
Air mattress	Mobility Equipment
Balance beam	Mobility Equipment
Bath lift	Mobility Equipment
Bolster and wedges	Mobility Equipment
Corner chair	Mobility Equipment
Floor ladder	Mobility Equipment
Gurney	Mobility Equipment
Mat	Mobility Equipment

Specialized Equipment Item	Equipment Category
Parallel bar	Mobility Equipment
Slant board	Mobility Equipment
Sliding board	Mobility Equipment
Wrist splint	Mobility Equipment
Other positioning equipment	Mobility Equipment
Adaptative vehicle	Mobility Equipment
Crutches	Mobility Equipment
Stroller-style wheel chair	Mobility Equipment
Wheelchair	Mobility Equipment
Other mobility equipment	Mobility Equipment
Adapted computer table	Computer Access
Alternate keystroke	Computer Access
Computer touch screen	Computer Access
Ergonomic keyboard	Computer Access
Mini keyboard	Computer Access
Mouth stick	Computer Access
Sideways keyboard holder	Computer Access
Trackball/joystick	Computer Access
Other computer access equipment	Computer Access
Aud-a-ball	Vision Aids
Books on tape	Vision Aids
Braille 'n speak	Vision Aids
Braille printer	Vision Aids
Braille thermofax	Vision Aids
Braille translation software	Vision Aids
Braille typewriter	Vision Aids
Braille writer	Vision Aids
Calculator (talking)	Vision Aids
Braille monitor	Vision Aids
Computer large monitor	Vision Aids
Talking keyboard	Vision Aids
Voice active	Vision Aids
Desktop closed circuit TV	Vision Aids
Illuminated magnifying glass	Vision Aids
Large print books	Vision Aids
Large print or screen enlargement software	Vision Aids
Laser cane	Vision Aids
Light box	Vision Aids
Low vision aid	Vision Aids
Magnifier	Vision Aids
Monoculars	Vision Aids
Optical scanner	Vision Aids
Opticon	Vision Aids
Portable vision	Vision Aids
Print to audio	Vision Aids
Recordings for the blind tape recorder	Vision Aids
Screen reading software	Vision Aids
Special typewriter	Vision Aids
Talkman	Vision Aids
Translator	Vision Aids
Other vision aids	Vision Aids
Alpha talker	Communication Devices
Bliss symbols	Communication Devices
Cheap talker	Communication Devices

Specialized Equipment Item	Equipment Category
Communication board	Communication Devices
Communication book	Communication Devices
Communication clock	Communication Devices
Computer-integrated speech synthesizer	Communication Devices
Computerized communication board	Communication Devices
Eye gaze chart	Communication Devices
Phonator	Communication Devices
Sip and puff morse code switch	Communication Devices
Wolf communication aid	Communication Devices
Automatic page turner	Communication Devices
Tele-teaching equipment	Communication Devices
Other communication device	Communication Devices
Adaptative play equipment	Recreation
Automatic swing	Recreation
Play equipment	Recreation
Tricycle	Recreation
Other recreation/leisure equipment	Recreation
Adaptative feeding equipment	Health and Hygiene
Feeding table	Health and Hygiene
Safety toilet support	Health and Hygiene
Shower chair	Health and Hygiene
Toileting equipment	Health and Hygiene
Other health and hygiene equipment	Health and Hygiene
Dressing dummy	Health and Hygiene
Lacing cube	Health and Hygiene

Appendix C

Top three specialized equipment items used by disability category

	Equipment Category	Sample Size	Population	Percent of students with the disability that use item
Specific Learning Disability (Population=2,807,268)				
Calculator	Basic Materials	1,668	1,392,448	49.6%
Computer (desktop)	Basic Materials	1,183	913,171	32.5%
Tape recorder	Basic Materials	457	430,979	15.4%
Speech/Language Impairment (Population=1,076,182)				
Computer (desktop)	Basic Materials	112	285,222	26.5%
Mirror	Communication Devices	144	272,175	25.3%
Tape recorder	Basic Materials	74	261,539	24.3%
Emotional Disturbance (Population=383,418)				
Calculator	Basic Materials	485	218,277	56.9%
Computer (desktop)	Basic Materials	398	163,358	42.6%
Tape recorder	Basic Materials	126	66,724	17.4%
Orthopedic Impairment (Population=66,110)				
Wheelchair	Mobility Equipment	113	30,877	46.7%
Computer (desktop)	Basic Materials	113	26,179	39.6%
Calculator	Basic Materials	95	25,017	37.8%
Mental Retardation (Population=565,281)				
Computer (desktop)	Basic Materials	542	284,917	50.4%
Calculator	Basic Materials	507	270,130	47.8%
Tape recorder	Basic Materials	308	145,689	25.8%
Hearing Impairment/Deafness (Population=59,240)				
Calculator	Basic Materials	114	23,763	40.1%
Auditory training system	Communication Devices	119	19,692	33.2%
Computer (desktop)	Basic Materials	102	16,185	27.3%
Traumatic Brain Injury (Population=12,073)				
Calculator	Basic Materials	74	6,182	51.2%
Computer (desktop)	Basic Materials	69	4,626	38.3%
Printer (laser)	Basic Materials	25	2,819	23.3%
Autism (Population=55,042)				
Computer (desktop)	Basic Materials	275	19,602	35.6%
Calculator	Basic Materials	168	17,883	32.5%
Tape recorder	Basic Materials	149	10,052	18.3%
Visual Impairment/Blindness (Population=22,241)				
Calculator	Basic Materials	72	9,235	41.5%
Books on tape	Vision Aids	63	8,138	36.6%
Computer (desktop)	Basic Materials	81	7,968	35.8%
Multiple Disabilities (Population=78,993)				
Computer (desktop)	Basic Materials	346	37,455	47.4%
Calculator	Basic Materials	257	30,347	38.4%
Tape recorder	Basic Materials	195	21,370	27.1%
Other Health Impairments (Population=238,975)				
Calculator	Basic Materials	419	107,128	44.8%
Computer (desktop)	Basic Materials	369	77,117	32.3%
Word processor	Basic Materials	134	40,872	17.1%
Preschool (Population=539,399)				
Computer (desktop)	Basic Materials	185	125,848	23.3%
Tape recorder	Basic Materials	123	122,289	22.7%
Mirror	Communication Devices	119	109,667	20.3%
Deaf-Blindness (Population=1,010)				
Computer (desktop)	Basic Materials	11	326	32.3%
Calculator	Basic Materials	9	259	25.6%
Auditory training system	Communication Devices	4	231	22.8%
Developmental Delay (Population=18,727)				
Mirror	Communication Devices	11	6,046	32.3%
Computer (desktop)	Basic Materials	49	2,911	15.5%
Calculator	Basic Materials	30	2,060	11.0%

Appendix D

Top five specialized equipment items used by age group

	Equipment Category	Sample Size	Population	Percent of students in the age group that use item
Preschool (Population=539,399)				
Computer (desktop)	Basic Materials	185	125,848	23.3%
Tape recorder	Basic Materials	123	122,289	22.7%
Mirror	Communication Devices	119	109,667	20.3%
Therapy balls	Mobility Equipment	132	109,331	20.3%
Play equipment	Recreation	116	88,553	16.4%
Ages 6 to 11 (Population=2,495,436)				
Computer (desktop)	Basic Materials	1551	823,288	33.0%
Tape recorder	Basic Materials	909	605,933	24.3%
Calculator	Basic Materials	981	558,480	22.4%
Mirror	Communication Devices	345	313,508	12.6%
Printer (laser)	Basic Materials	476	257,608	10.3%
Ages 12 to 17 (Population=2,573,743)				
Calculator	Basic Materials	2653	1,551,371	60.3%
Computer (desktop)	Basic Materials	1837	896,808	34.8%
Word processor	Basic Materials	665	398,519	15.5%
Printer (laser)	Basic Materials	669	373,461	14.5%
Tape recorder	Basic Materials	626	353,211	13.7%
Ages 18 to 22 (Population=315,381)				
Calculator	Basic Materials	334	188,700	59.8%
Computer (desktop)	Basic Materials	262	118,943	37.7%
Printer (laser)	Basic Materials	98	57,509	18.2%
Word processor	Basic Materials	98	50,739	16.1%
Tape recorder	Basic Materials	109	39,917	12.7%

Exhibit reads: For preschool students in special education, a desktop computer is the most frequently used specialized equipment item, used by 23.3 percent of preschool students.

Appendix E

Pricing the Specialized Equipment

Prices for each item on the specialized equipment list were gathered by team members from the online catalogues of specialized equipment vendors. To account for the substantial variation in cost that often existed between vendors and within categories, minimum and maximum and/or average values were recorded. For the items on the list that could not be found or could not be clearly defined, team members consulted with Carol Zepecki, Director of Special Education and Student Services at the Palo Alto Unified School District (PAUSD); Jennifer Dorwin, vision specialist at PAUSD; and Mary Holte, an AIR employee with special education teaching experience.

Some of the specialized equipment items were not specific enough to obtain accurate pricing for a single item.¹⁹ For these items, the price was determined by taking the weighted average of prices within its given domain. For example, the price of “other computer access equipment” was determined by taking the weighted average of the items in the category “Computer Access Equipment.” The same process was used to approximate the price of items for which prices could not be found.²⁰

Many of the specialized equipment items had an average or minimum/maximum prices, but not both. For these items, the average price was substituted for the minimum and maximum values when they were not available. When the average value did not exist for a particular item of equipment, it was determined by taking the mean of the minimum and maximum prices.

Calculating the Annual Cost of Specialized Equipment

In order to estimate the annual cost of specialized equipment, it was necessary to take into account the depreciation and the interest on the undepreciated value of each equipment item. Levin and McKewan have developed annualization factors that are determined by these two elements and can be multiplied by the cost of the equipment to obtain the annual cost of equipment.²¹ In order to determine which annualization factor to use, we assumed a life span of four years for specialized equipment items and used an interest rate of 5, 7, and 10 percent. The equipment cost per pupil was then determined by dividing the annual cost of each equipment item by the number of students sharing the

¹⁹ The following items fall into this category: other positioning equipment, other computer access equipment, other vision aids, other communication device, other mobility equipment, adaptative vehicle, other recreation/leisure equipment, and other health and hygiene equipment.

²⁰ The pricing for the following items was determined in this manner: phonator and dressing dummy.

²¹ For further details, please see Levin, H. & McKewan, P. *Cost-Effectiveness Analysis*. pp 64-70

item.²² Because pricing information exists for average, minimum, and maximum prices, the total cost and per pupil cost were determined at all three pricing levels.

These calculations produced the total dollar amount spent on specialized equipment (nationally and per pupil). We also calculated the amount spent on specialized equipment as a percentage of spending on special education students. The percentage of expenditures (both total expenditures and specific special education expenditures) spent on specialized equipment is listed at 5, 7, and 10 percent interest rates and at average, minimum, and maximum pricing values.

The following tables show the results of these calculations. Appendix B-1 shows expenditures in dollar amounts and as a percentage of special education spending at 5 percent interest. Appendix B-2 and B-3 contain the same information for 7 percent and 10 percent, respectively:

Appendix B-1: Special Equipment Expenditures at 5 Percent Interest

	Using MIN Price	Using MAX Price	Using Avg Price
Total Expenditures on Specialized Equipment	\$309,358,768	\$579,723,288	\$444,541,028
Average Per Pupil Expenditures on Sp Equip.	\$81.28	\$152.31	\$116.79
As a Percentage of Total Expenditures			
Total Expenditures (78.3 Billion)	0.395%	0.740%	0.568%
Total Special Expenditures (50 billion)	0.619%	1.159%	0.889%
As a Percentage of Per Pupil Expenditures			
Total Per Pupil Expenditures (\$12,639)	0.643%	1.205%	0.924%
Special Per Pupil Expenditures (\$8,080)	1.006%	1.885%	1.445%

Appendix B-2: Special Equipment Expenditures at 7 Percent Interest

	Using MIN Price	Using MAX Price	Using Avg Price
Total Expenditures on Specialized Equipment	\$323,839,392	\$606,859,271	\$465,349,332
Average Per Pupil Expenditures on Sp Equip.	\$85.08	\$159.44	\$122.26
As a Percentage of Total Expenditures			
Total Expenditures (78.3 Billion)	0.414%	0.775%	0.594%
Total Special Expenditures (50 billion)	0.648%	1.214%	0.931%
As a Percentage of Per Pupil Expenditures			
Total Per Pupil Expenditures (\$12,639)	0.673%	1.261%	0.967%
Special Per Pupil Expenditures (\$8,080)	1.053%	1.973%	1.513%

²² The original database includes a variable for the number of students that share each item of equipment. When this variable equals zero, we make the assumption that one child is using that piece of equipment.

Appendix B-3: Special Equipment Expenditures at 10 Percent Interest

	Using MIN Price	Using MAX Price	Using Avg Price
Total Expenditures on Specialized Equipment	\$346,108,835	\$648,591,125	\$497,349,980
Average Per Pupil Expenditures on Sp Equip.	\$90.93	\$170.40	\$130.67
As a Percentage of Total Expenditures			
Total Expenditures (78.3 Billion)	0.442%	0.828%	0.635%
Total Special Expenditures (50 billion)	0.692%	1.297%	0.995%
As a Percentage of Per Pupil Expenditures			
Total Per Pupil Expenditures (\$12,639)	0.719%	1.348%	1.034%
Special Per Pupil Expenditures (\$8,080)	1.125%	2.109%	1.617%

Sensitivity Analysis

Ultimately, using 5, 7, or 10 percent as the interest rate in determining specialized equipment costs made little difference. Using different interest rates results in a per pupil spending difference of less than \$20. As a percentage of funding for special education students, the use of different interest rates makes a difference of less than two tenths of one percent.

Similarly, there was little difference in cost when using average, minimum, or maximum prices. In dollars, the spending difference per pupil is never greater than \$40. As a percentage of total and per pupil expenditures, the difference is never even as high as one half of one percent.

Given the similarity in pricing among cost choices, we feel that the most appropriate approach is to use the average prices of specialized equipment and an interest rate of 7 percent. The differences between average, minimum, and maximum prices are minimal, and average value appears to be most representative among the three. Furthermore, the average value is a more conservative approach to pricing the specialized equipment. Because pricing was determined from a relatively small set of resources, average pricing avoids the distortion of extreme pricing that could result from unusual items in a given catalogue or database.