

The Impact of Braille Reading Skills on Employment, Income, Education, and Reading Habits

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Abstract

This study compared a number of outcomes for congenitally legally blind adults who learned to read braille or print as their original reading medium. It was found that those who learned to read using braille had higher employment rates and educational levels, were more financially self-sufficient, and spent more time reading than did those who learned to read using print.

The decline in the number of braille readers since 1963 (American Printing House for the Blind, 1991) has been widely discussed by professionals and censured by consumer groups (Rex, 1989; Schroeder, 1989; Stephens, 1989). Although there is no consensus on the causes of this decline, a number of factors have been cited. Among them are the rise in the number of visually impaired children with additional disabilities who are nonreaders (Rex, 1989), disputes on the utility of the braille code (Thurlow, 1988), the decline in teachers' knowledge of braille and methods for teaching it (Schroeder, 1989; Stephens, 1989), negative attitudes toward braille (Holbrook & Koenig, 1992; Rex, 1989), and the greater reliance on speech output and print-magnification technology (Paul, 1993).

Pressure from consumers and advocacy groups has led 27 states to pass legislation mandating that children who are legally blind be given the opportunity to learn braille. These laws have created further controversy in the field (Rex, 1992; Schroeder, 1992; Virginia State Department, 1991). Whereas professional groups, such as the Council of Executives of American Schools for the Visually Handicapped, have called for a renewed emphasis on teaching braille (Mullen, 1990), others have stressed that braille is only one educational option (Paul, 1993).

The majority of literature in the field regarding braille reading is in the form of qualitative studies and position papers. Without the balance of quantifiable data, how can any position on the use of braille be rationally supported or refuted? How can teachers determine when to teach braille and to whom or consider more basic questions: Should the field continue to emphasize braille? Do the outcomes of early braille training justify the educational resources required to provide it? Can training in braille reading be linked to measures of the economic success of adults?

A causal relationship between reading medium alone (either braille or print) and the economic success of adults is difficult to establish. However, the possible effects of a particular reading medium on the lives of visually impaired children and adults warrant more objective and quantifiable research than has been conducted so far. The aim of the study presented here, which was part of a larger study of the reading habits and employment of legally blind adults, was to add to the knowledge in these areas.

Most disciplines accept that the primary indicators of socioeconomic status in this society are employment and education. Therefore, if higher education, employment, and financial self-sufficiency are considered indicators of success in adult life, the following research questions become evident:

1. What impact does early braille training have on the employment rates of visually impaired adults?
2. Does the skill of early braille reading influence the reading habits of visually impaired adults?
3. Do visually impaired adults who learned to read braille as their original reading medium have higher rates of economic independence?

Method

A search of the literature revealed few longitudinal studies that measured or defined the success of educational decision makers in determining reading media for visually impaired children. For obvious reasons, an experimental design was considered inappropriate for the study. Therefore, because the author was interested in obtaining quantifiable data, she chose a structured interview design with a variety of open-ended, multiple choice free-answers, and dichotomous questions. She then conducted telephone interviews with adults who fit the criteria for inclusion. To assess interrater reliability, random subjects were informed that a third party would quietly listen in on the interviews and record answers on a scoring sheet.

IDENTIFICATION OF SUBJECTS

The Washington State Library for the Blind and Physically Handicapped (WSLBPH) identified adults on this registration list who met the following criteria: They were legally blind, aged 18-55, and had no concomitant disabilities; 55 was chosen as the cutoff point to avoid the confounding effect of unemployment because of retirement or ill health in old age. Although the majority of adults in the state who are legally blind are registered with WSLBPH, the fact that the study was restricted to eligible adult patrons of the library who resided in Washington is a limitation of the study. (WSLBPH also serves some persons who live outside the state, but they were not included in the study.)

For the larger study, WSLBPH mailed a packet to 900 identified people that included a letter explaining the study and a return postcard. The potential subjects were asked to return the postcard indicating their willingness to participate and to include their telephone numbers and convenient times for them to be interviewed. Twenty-three packets were returned unopened because of incorrect addresses, and 303 response cards granting permission to be interviewed for the larger study were received. To protect the potential subjects' anonymity, the response cards did not include identifying information, such as names and addresses. Thus, it was not possible to do follow-up mailings to track nonrespondents.

During the actual interview process, 51 potential subjects who could not be contacted on the first try were called four or five times during the eight-week project before they were considered ineligible. Another 77 were eliminated when they were called because they did not meet the criteria for inclusion but had not been ruled out during initial screening. Most of those who were eliminated had concomitant disabilities, deaf-blindness, or cerebral palsy; in addition, several were above the age ceiling of 55, and one was under 18. From the pool of the remaining 175 subjects, a subgroup of 74 persons were identified who met all the criteria and were congenitally visually impaired. These 74 persons were the subjects of the smaller study reported here.

INTERVIEWS

The majority of the telephone interviews were conducted in the evenings, according to the subjects' preferences, and lasted an average of 15-20 minutes. Numbers were assigned to the subjects, and the original phone numbers were not entered with the data.

During the interviews, the subjects were asked 35-40 questions. These questions were designed to elicit their visual history; current visual status; preference for and perceptions of past and present reading media (braille or print; listening to audiotaped books was not included); educational background; and current employment, income, occupation, and reading habits.

The subjects' responses were categorized, coded, and analyzed using descriptive statistics (chi-square). To measure the accuracy of the scores and categories of responses, a second scorer simultaneously listened to the interviews and scored and categorized a randomly selected sample of eight subjects. The interrater agreement for the sample was 96 percent.

SUBJECTS

All 74 subjects were congenitally legally blind at the time of the interviews, having been -diagnosed as legally blind before age 2, and therefore, had no memory of normal vision. Of the 74, 42 were women and 32 were men, who lived in rural and urban areas. As was mentioned earlier, the subjects ranged in age from 18 to 55; 7 (9%) were 18-24, 12 (16%) were 25-30, 8 (11%) were 31-36, 32 (43%) were 37-42, 9 (12%) were 43-48, and 6 (8%) were 49-55.

Thirty-one subjects were employed, 6 part time and 25 full time, and 43 were unemployed, yielding an unemployment rate of 58%. (The unemployment rate for the 175 in the larger study was 66%, which parallels the national unemployment rate for visually impaired adults reported by Kirchner & Peterson, 1988). The subjects' annual personal incomes ranged from less than \$7,000 to \$70,000; the majority (39, or 53%) reported annual incomes of less than \$7,000.

The majority of the subjects (42, or 57%) reported current vision levels of no light perception or light perception only (19 men and 23 women). In addition, 22 (29%) had vision levels between 20/300 and shadow vision, and the vision of the remaining 10 (14%) ranged from 20/200 to 20/300, Eleven subjects said that their visual acuity had deteriorated before they graduated from high school, and 18 said that it had deteriorated afterward; 3 reported improved visual activity during their school years.

With regard to educational levels, 10 subjects (14%) had a high school education or less, 23 (31 %) had attended college but had not graduated, 24 (32%) had bachelor's degrees, and 17 (23%) had graduate degrees. The women tended to be slightly better educated than the men; 12 (29%) of the 42 women, compared to 6 (19%) of the 32 men, had graduate degrees.

With regard to reading media, 43 subjects (58%) had learned to read braille as their original primary medium (hereafter referred to as the BR group) and 31 subjects (42%) had learned to read print as their original primary medium (hereafter referred to as the PR group) in childhood. One of the subjects who had initially learned to read braille uses both braille and print as an adult.

Results

EMPLOYMENT

As Figure 1 shows, the BR group had a significantly lower unemployment rate (44%) than did the PR group (77%) ($\chi^2 = 10.499$; $p < .0148$). Of those who were employed, 16 percent of the BR group and 13 percent of the PR group were in professional positions, 23 percent of the BR group and 10 percent of the PR group were in skilled positions, and 16 percent of the BR group, but none of the PR group, were in unskilled positions. Furthermore, 42 percent of the BR group versus 23 percent of the PR group were employed full time (40 or more hours per week), and 14 percent of the BR group, but 3 percent of the PR group, were employed part time ($\chi^2 = 7.031$ $p < .0297$).

Figure 1. Employment breakdown by original reading medium. (NOTE: the figure was originally in chart format.)

	Original Medium	
	Print	Braille
Unemployed	77%	44%
Unskilled	0%	16%
Skilled	10%	23%
Professional	13%	16%

The extent of braille usage in adulthood was an important variable in examining the employment

rates of the BR group. Using qualifying criteria for each category, the author determined braille usage to be extensive, some, or minimal. Extensive braille usage did not guarantee employment, but within the BR group, it was apparent that the subjects who reported extensive personal and/or professional use of braille had a far lower unemployment rate (33%) than did the total sample (58%). Of the 24 subjects in the BR group who were employed at the time of the study, 22 met the criteria for extensive braille users.

Five subjects in the PR group were taught to read braille after they learned to read print. None reported using braille extensively, and all were unemployed at the time of the study.

READING HABITS

Addressing reading in this type of research design is problematic, particularly because the study was based on self-reported data. Therefore, three symbols of literacy in this society were examined: the number of hours per week spent reading (braille or print), the number of books read in an average year, and the number of magazines currently subscribed to. Figure 2 compares the number of hours in an average week that the BR and PR subjects spent reading (for their jobs and for pleasure). It is significant that 16 subjects in the BR group and 5 in the PR group read more than 21 hours per week ($\chi^2 = 13.852$; $p < .0166$), whereas 3 in the BR group versus 9 in the PR group read 1 hour or none during an average week.

Figure 2. Number of hours per week spent reading. (NOTE: the figure was originally in chart format.)

	Time spent reading (hours per week)									
	0-1 hours		2-5 hours		6-10 hours		11-20 hours		21+ hours	
	Braille	Print	Braille	Print	Braille	Print	Braille	Print	Braille	Print
Number of subjects	3	9	4	9	9	4	10	4	16	5

As Figure 3 shows, the BR group read significantly more books per year than did the PR group ($\chi^2 = 23.138$; $p < .0008$). Thirteen of the 43 BR subjects but only 3 of the 31 PR subjects read 21 or more books per year, and 3 BR subjects versus 14 PR subjects read no books per year. These findings are consistent with the greater number of hours per week that the BR group spent reading. Furthermore, in accord with the greater amount of time spent reading and books read, the BR group reported subscribing to significantly more magazines than did the PR group ($\chi^2 = 13.435$; $p < .0038$). For example, 8 BR subjects but 18 PR subjects subscribed to no magazines (see Figure 4).

	Books Read									
	None		1-5 books		6-10 books		11-20 books		21+ books	
	Braille	Print	Braille	Print	Braille	Print	Braille	Print	Braille	Print
Number of subjects	3	14	16	5	4	7	7	2	6	3

Figure 3. Number of books read per year. (NOTE: the figure was originally in chart format.)

Table 1 depicts the point basis for a scale on which each subject was assigned points based on values of the three variables previously discussed. The total points attained by the subjects were plotted on a 10-point scale, and the subjects were divided into four groups. The subjects in Group 1 scored 0 or 1 point; those in Group 2 scored 2, 3, or 4 points; those in Group 3 scored 5,

6, or 7 points; and those in Group 4 scored 8 or 9 points. For example, a subject who read 12 hours in an average week, read 4 books in the previous year and who currently subscribed to 6 magazines would receive a total of 5 points and hence would be placed in Group 3.

	Magazine Subscriptions							
	None		1-3		4-6		7+	
	Braille	Print	Braille	Print	Braille	Print	Braille	Print
Number of subjects	8	18	19	7	9	5	7	1

Figure 4. Magazine subscriptions at the time of the study.

Thirty-six percent of the PR subjects and 4 percent of the BR subjects were in Group 1, 35 percent of the PR subjects and 33 percent of the BR subjects were in Group 2, 26 percent of the PR subjects and 47 percent of the BR subjects were in Group 3, and 3 percent of the PR subjects and 16 percent of the BR subjects were in Group 4. The results were significant ($\chi^2 = 14.674$; $p < .0021$), the most noticeable difference being in Group 1.

Table 1 Basis for scale.

Variables	0 Points	1 Point	2 Points	3 Points
Hours spent reading per week	0-1 hour	2-6 hours	7-20 hours	20 or more hours
Number of books read	None	1-5 books	6-20 books	20 or more books
Number of magazines subscribed to	None	1-3 magazines	4-7 magazines	7 or more magazines

EDUCATION

The overall difference in the educational levels of the BR and the PR groups was small but not statistically significant ($\chi^2 = 4.035$; $p < .2577$). The distinction between early braille readers and early print readers was at the highest level of education: Thirteen (30%) of the 43 BR subjects but only 4 (13%) of the 31 PR subjects obtained graduate degrees. It is also worth noting that only 2 of the subjects in this sample ($n=74$) and in the larger sample ($n=175$) had doctoral degrees; both were in the BR group.

SELF-SUFFICIENCY

Although the overall income levels of the two groups were not statistically significant ($\chi^2 = 7.059$, $p < .2163$), the representation of the BR and PR subjects in the three income ranges—highest range (\$25,000 to \$70,000), middle range (\$7,000 to \$25,000), and lowest range (\$7,000 or less)—are of interest. The BR group was overrepresented in the highest range, and the PR group was overrepresented in the lowest range, but both groups were similarly represented in the middle range. Thus, 25 percent of the BR group versus 7 percent of the PR group were in the highest range, 28 percent of the BR group and 31 percent of PR group were in the middle range, and 47 percent of the BR group but 62 percent of the PR group were in the lowest range. In addition, the subjects' responses to the question, "Do you receive money on a regular basis from a nonemployment source, such as SSI [Supplemental Security Income], SSDI [Social Security Disability Insurance], public assistance, food stamps, or Medicaid?" were significant ($\chi^2 = 4.805$; $p < .0284$): 49 percent of the BR group, compared to 74 percent of the PR group, regularly

received such public entitlement benefits.

PAST AND PRESENT READING ABILITY

In any study, self-reported data, especially retrospective data, must generally be considered suspect. Nevertheless, the subjects' responses to questions regarding their perceptions of their past and present reading ability tended to follow the other trends reported here:

1. As a junior high school student, could you read as fast and as fluently as your classmates? Nine of the 31 subjects in the PR group, compared to 35 of the 43 subjects in the BR group answered yes.
2. Do you consider yourself a good reader today? Nineteen of the 31 subjects in the PR group versus 40 of the 43 subjects in the BR group answered yes.

VISUAL ACUITY

Of the 74 subjects, 14 reported having had 20/200 visual acuity since birth that had remained stable throughout their adult lives. This level of acuity is the upper limit of the definition of legal blindness. Thirteen of these 14 subjects learned to read print and were included in the PR group; seven of the 14 subjects received braille instruction later in life, but used print as their current primary reading medium. Four of the 14 subjects were employed. Although most subjects in the PR group reported little knowledge of the braille code, the 4 employed subjects in this group all reported knowing "some" braille.

The only one of the 14 who was taught to read braille as a child said that she reads both print and braille as an adult, but used print as her primary reading medium. She was 1 of the 4 who was employed in this group. Since this group contained 13 PR subjects and only 1 BR subject, quantitative analysis of the data was not possible.

Instruction in braille reading traditionally has been reserved for students with the most severe vision loss - those who cannot see print. It is typically assumed by the general public that the greater the amount of vision a child or adult has, the greater his or her advantage in employment and education. The findings of this study did not support that supposition: Acuity was not a statistically significant factor in the employment or educational levels the subjects attained. However, the recipients of public entitlement programs were exceptions to these findings. Those with partial sight were represented in significantly greater proportions than were those with little or no sight ($\chi^2 = 6.045$; $p < .045$). (This finding also held true for its subjects in the larger study [$\chi^2 = 7.648$; $p < .0218$].)

Contrary to common perceptions, more sight was not synonymous with lower unemployment rate and financial independence in this study. The subjects who reported the least amount of vision-light perception only or no light perception had an unemployment rate of 52 percent, whereas those with the greatest degree of vision-20/200-20/300-had an unemployment rate of 67 percent.

Discussion

It is an effort of gargantuan proportions to attempt to isolate the impact of a reading medium on the life of an adult who is visually impaired. The interaction of a multitude of confounding variables (such as mobility, financial disincentives, and social biases) complicates and confuses attempts to study employment rates and measures of literacy or financial independence.

The legally blind adult subjects were chosen and screened to provide as representative a sample as possible of otherwise nondisabled visually impaired adults in the state of Washington. However, because questions of home support, motivation, intellectual ability, educational placement, and the like were not addressed, it is possible that an analysis that would include these variables would also yield significant results. Nevertheless, it is rational to expect that the diverse values of these independent variables existed in both the BR and the PR groups and thus should not have significantly altered the findings. However, these issues and their impact on the

concerns addressed here should be the focus of future studies in the field.

It is sometimes confusing and always disturbing to read of the staggering unemployment rates of adults with visual impairments. The implications for the future of today's generation of children with visual impairments are sobering for professionals in the field. Rather than focusing on the seemingly overwhelming task of determining why so many adults with visual impairments are unemployed, this study concentrated on one possible common factor of the 33 percent who are employed.

The impact of braille reading skills on the subjects' employment rates was significant--with qualifications. Having a knowledge of braille, even as a primary reading medium, did not increase a subject's chances of employment, but those who had learned to read braille as their original reading medium and used it extensively were employed at a significantly higher rate. Thus, the extensive and early acquisition of braille reading skills were the two factors that had a strong impact on employment rates. The subjects who had been taught to read braille as children were employed (either full time or part time) at more than twice the rate of those who were taught to read print. However, the subjects who learned braille after they learned to read print did not have a higher employment rate than those who had not learned braille.

In this society, the ability to read well is highly valued. It is an ability to which school districts devote copious amounts of funds and resources. Classroom teachers spend countless hours coaxing children to develop the lifelong habit of reading. In this study, the BR subjects demonstrated those positive reading habits at a significantly greater rate than did the PR subjects. They spent substantially more time reading, read more books, and subscribed to more magazines. This finding is particularly noteworthy when one considers the comparative availability of print and braille materials. Because higher education depends to a great extent on a background of reading skills and habits, it is not surprising that the BR group also had more graduate degrees.

Not only were the BR subjects more prolific readers, but they perceived their reading abilities, both as children and as adults, in a more positive light than did the PR subjects. Whether those who were taught to read braille were actually more fluent, skilled readers as children than were those who were taught to read print is an issue for further study. The point of interest here is that the overwhelming majority of the BR subjects (81%) had elevated perceptions of their abilities compared to only 29 percent of the PR subjects.

Rehabilitation is also affected by the inability of visually impaired children to read. Excessive rehabilitation dollars are spent annually on visually impaired young adults who are recent graduates of public (and residential) school programs for visually impaired children. Rehabilitation programs that were originally designed to retrain adventitiously blind adults designate a large portion of their annual budgets to congenitally visually impaired adults who, in theory, should have been "habilitated" in childhood education programs. But in reality, many visually impaired young adults are not sufficiently accomplished in literacy or alternative skills to complete higher-level degrees or obtain employment.

As Koenig and Holbrook (1989) noted, the 10-15 percent of visually impaired children who are totally blind should present little concern to educators regarding whether they should be taught to read braille since those children who are cognitively and physically capable of reading will be taught to read braille. It is the remaining 85 percent of visually impaired children with various degrees of residual vision who present the "print or braille" dilemma to their multidisciplinary teams. The results of this study suggest that teaching braille as an original primary reading medium to children with visual impairments may encourage them to develop the positive lifelong habit of reading as adults, enhance their later employment opportunities, and thereby increase the possibility of financial independence.

Recommendations

As the field of education moves toward the full inclusion of students with disabilities in regular school programs, it is imperative that vision professionals resist the urge to "normalize" visually impaired children by insisting that they read only print. All too frequently, decisions on reading

media are based on available resources, rather than on the needs of students. According to Tuttle and Heinze (cited in Caton, 1991), over 1,400 additional certified teachers are needed nationwide to meet the educational needs of unserved and underserved children with visual impairments. Teachers of children with visual impairments are typically expected to teach 16 or more students who are widely spread over large geographic areas (Caton, 1991). Given such conditions, dedicated itinerant teachers are frequently forced to assume consulting rather than active teaching roles. Children cannot adequately be taught to read (in print or braille) by consultants. It is tragic that school districts (and professionals) may opt to recommend print as a reading medium under such circumstances. This article did not address that critical shortage.

However, it should be noted here that in the face of the restructuring of many university teacher training programs, it is imperative to retain and support the growth of categorical teacher training programs in the field. The shortage of qualified teachers, as well as researchers, has contributed heavily to the problems the field now faces. Without qualified teachers, alternative skills, such as braille, which are specific to individuals with visual impairments, will, by necessity, be taught so infrequently that they will eventually become all but extinct. If the results of this study are an indicator, omitting braille reading instruction from the curriculum of visually impaired children may well create a handicap far more debilitating than blindness - chronic unemployment.

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