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

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From the Editor: As a society we have become increasingly alarmed in recent years about the growing illiteracy rate among our children and young adults. This increase is occurring, of course, at the very time in our nation's economic life when the need for true literacy is increasing. Today's jobs require much more skill and technical expertise than ever before, and unskilled and manual-labor jobs are on the decline. In response to this national crisis, literacy programs are springing up everywhere, and both governmental and private-sector programs are being created and publicized. Just about everyone agrees that increased literacy means increased opportunity and a better chance for a real share in the American dream.

For blind people improved Braille literacy has been the focus. It has always seemed self-evident that our chance for success and to share in the American dream increases in direct proportion to our ability to read and write effectively.

However, while our common sense has told us that blind people must master Braille to succeed, supposed common sense has also told many in the field of special education that such skills are not important for the blind and that tapes or computers or large print or magnification devices can be just as effective as (or maybe even more effective than) reading and writing Braille.

Now we have a chance to take a look at this important question, not merely applying common sense and using anecdotal experience, but examining empirical data derived from an objective, professional study. The results are not only interesting but enlightening and instructive. We can only hope that an entirely new body of knowledge is emerging—data that once and for all can settle the question of the critical need for Braille for all blind people who cannot read print easily, rapidly, and steadily.

This study was conducted several years ago by Dr. Ruby Ryles, now head of the Orientation and Mobility master's degree program at Louisiana Tech University. This was her first major study examining the effectiveness of Braille (since its completion she has done a much more extensive study of Braille-literacy skills). The following article was peer-reviewed and published in the May/June, 1996, issue of the Journal of Visual Impairment and Blindness.

Dr. Ryles began her professional career as a first and second grade teacher of sighted children. She specialized in reading and taught sighted children for nine years.

Then her son Dan was born blind. In order to help Dan more effectively, Dr. Ryles

returned to school to specialize in the education of blind children. Armed with these new credentials and her practical experience as the mother of a blind child, she worked for a number of years teaching blind children in Arkansas, Alaska, and Washington State.

Because of her personal experience as a mother and teacher and her increasing understanding of the problems faced by blind adults, Dr. Ryles began to recognize the need for a new kind of training and preparation for teachers of the blind. She recognized the need for teacher training dealing with attitudes about blindness and stressing the need for Braille literacy. She began to understand that this very specific teacher training must occur if blind children are to have the chance to develop into confident, competent, and successful blind adults. Therefore, she enrolled in a doctoral program in special education at the University of Washington.

While she was working on her doctorate, Dr. Ryles conducted her first major study of Braille versus print for partially blind people. She did not consider the reason or reasons for the drastic decline in the use of Braille in America. Rather she was interested in obtaining objective information about the effectiveness of Braille: specifically, were economic and other benefits a predictable and measurable outcome when people had been taught and were using Braille?

In order to qualify for the study, candidates had to be congenitally legally blind, be between the ages of eighteen and fifty-five, and have no other disabilities. Of the seventy-four adults in the group, forty-three subjects had learned Braille as their "original, primary medium," and thirty-one had learned to read using print. This study begins to provide the objective information we need on the question of Braille versus print. The study reveals that those who were taught Braille from the beginning had higher employment rates, were better educated and more financially self-sufficient, and spent more time doing pleasure and other reading than the print users.

The pertinent parts of the study as reported in the Journal of Visual Impairment and Blindness follow:

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 twenty-seven [now twenty-nine]

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 eighteen to fifty-five, and had no concomitant disabilities; fifty-five 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 non-respondents.

During the actual interview process fifty-one 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 seventy-seven were eliminated when they were called because they did not meet the criteria for inclusion but had not been ruled out during the 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 fifty-five, and one was under eighteen. From the pool of the remaining 175 subjects, a subgroup of seventy-four persons was identified who met all the criteria and were congenitally visually impaired. These seventy-four 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 fifteen to twenty 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 thirty-five to forty 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 seventy-four subjects were congenitally legally blind at the time of the interviews, having been diagnosed as legally blind before age two, and therefore had no memory of normal vision. Of the seventy-four, forty-two were women and thirty-two were men, who lived in rural and urban areas. As was mentioned earlier, the subjects ranged in age from eighteen to fifty-five; seven (9 percent) were eighteen to twenty-four, twelve (16 percent) were twenty-five to thirty, eight (11 percent) were thirty-one to thirty-six, thirty-two (43 percent) were thirty-seven to forty-two, nine (12 percent) were forty-three to forty-eight, and six (8 percent) were forty-nine to fifty-five.

Thirty-one subjects were employed, six part-time and twenty-five full-time, and forty-three were unemployed, yielding an unemployment rate of 58 percent. (The unemployment rate for the 175 in the larger study was 66 percent, 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 (thirty-nine, or 53 percent) reported annual incomes of less than $7,000.

The majority of the subjects (forty-two, or 57 percent) reported current vision levels of no light perception or light perception only (nineteen men and twenty-three women). In addition, twenty-two (29 percent) had vision levels between 20/300 and shadow vision, and the vision of the remaining ten (14 percent) ranged from 20/200 to 20/300. Eleven subjects said that their visual acuity had deteriorated before they graduated from high school, and eighteen said that it had deteriorated afterward; three reported improved visual activity during their school years.

With regard to educational levels, ten subjects (14 percent) had a high school education or less, twenty-three (31 percent) had attended college but had not graduated, twenty-four (32 percent) had bachelor's degrees, and seventeen (23 percent) had graduate degrees. The women tended to be slightly better educated than the men; twelve (12 percent) of the forty-two women, compared to six (19 percent) of the thirty-two men, had graduate degrees.

With regard to reading media, forty-three subjects (58 percent) had learned to read Braille as their original primary medium (hereafter referred to as the BR group), and thirty-one subjects (42 percent) 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 percent) than did the PR group (77 percent) ($X2=10.499$; $p<.0148$). 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 (forty or more hours per week), and 14 percent of the BR group, but 3 percent of the PR group, were employed part time ($X2=7.031$ $p<.0297$).

FIGURE 1: Employment breakdown by original readium medium.

NOTE: Figure 1 represents visually the data reported in the text.

The extent of Braille use 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 use to be extensive, some, or minimal. Extensive Braille use 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 percent) than did the total sample (58 percent). Of the twenty-four subjects in the BR group who were employed at the time of the study, twenty-two 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 sixteen subjects in the BR group and five in the PR group read more than twenty-one hours per week ($X2=13.852$: $p<.0166$), whereas three in the BR group versus nine in the PR group read one hour or none during an average week.

FIGURE 2: Number of hours a week spent reading.

NOTE: Figure 2 represents the number of hours spent reading each week--0 to 1 hours,

Braille readers 3, print readers 9; 2 to 5 hours a week, Braille readers 4, print readers 9; 6 to 10 hours a week, Braille readers 9, print readers 4; 11 to 20 hours a week, Braille readers 10, print readers 4; and 21 or more hours a week, Braille readers 16, print readers 5.

As Figure 3 shows, the BR group read significantly more books per year than did the PR group ($X2=23.138:p<.0008$). Thirteen of the forty-three BR subjects but only three of the thirty-one PR subjects read twenty-one or more books per year, and three BR subjects versus fourteen 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 ($X2=13.435: p<.0038$). For example, eight BR subjects but eighteen PR subjects subscribed to no magazines (see Figure 4).

NOTE: Figure 3 represents the number of books read per year—zero books a year, 3 Braille readers, 14 print readers; 1 to 5 books a year, 16 Braille readers, 5 print readers; 6 to 10 books a year, 4 Braille readers, 7 print readers; 11 to 20 books a year, 7 Braille readers, 2 print readers; and 21 and over books a year, 6 Braille readers, 3 print readers.

Figure 4 represents magazine subscriptions at the time of the study—zero subscriptions, 8 Braille readers, 18 print readers; 1 to 3 subscriptions, 19 Braille readers, 7 print readers; 4 to 6 subscriptions, 9 Braille readers, 5 print readers; over 7 subscriptions, 7 Braille readers, 1 print reader.

FIGURE 3: Number of books read per year.

FIGURE 4: Magazine subscriptions at the time of the study.

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.

Table 1: Basis for Scale.

NOTE: The table represents points awarded for hours a week spent reading, books a year read, and magazine subscriptions. Hours spent reading a week: 0 points for 0 to 1 hour, 1 point for 2 to 6 hours a week; 2 points for 7 to 20 hours a week; 3 points for 20 or more hours a week. Number of books read a year: 0 points for 0 to 1 book read; 1 point for 1 to 5 books read; 2 points for 6 to 20 books read; and 3 points for 20 or more books read. Number of magazines subscribed to: 0 points for none; 1 point for 1 to 3 magazines; 2

points for 4 to 7 magazines; and 3 points for 7 or more magazines.

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 twelve hours in an average week, read four books in the previous year, and currently subscribed to six magazines would receive a total of five points and hence would be placed in Group 3.

Thirty-six percent of the PR subjects and four 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 ($X2=14.674$: $p<.0021$), the most noticeable difference being in Group 1.

Education: The overall difference in the mean educational levels of the BR and the PR groups was small and not statistically significant ($X2=4.035$; $p<.2577$). 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 four (13%) of the thirty-one PR subjects obtained graduate degrees. It is also worth noting that only two 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 ($X2=7.059$, $p<.2163$), 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 ($7,000 or less)--are of interest. The BR group was over-represented in the highest range, and the PR group was over-represented in the lowest range, but both groups were similarly represented in the middle range. Thus 25 percent of the BR group versus 7 percent of the PR group were in the highest range, 28 percent of the BR group and 31 percent of the PR group were in the middle range, and 47 percent of the BR group but 62 percent of the PR group were in the lowest range. In addition, the subjects' responses to the question, "Do you receive money on a regular basis from a nonemployment source, such as SSI (Supplemental Security Income), SSDI (Social Security Disability Insurance), public assistance, food stamps, or Medicaid?" were significant ($X2=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 thirty-one subjects in the PR group, compared to thirty-five of the forty-three subjects in the BR group answered yes.

2. Do you consider yourself a good reader today? Nineteen of the thirty-one subjects in the PR group versus forty of the forty-three subjects in the BR group answered yes.

Visual Acuity: Of the seventy-four subjects, fourteen

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 fourteen subjects learned to read print and were included in the PR group; seven of the fourteen subjects received Braille instruction later in life but used print as their current primary reading medium. Four of the fourteen subjects were employed. Although most subjects in the PR group reported little knowledge of the Braille code, the four employed subjects in this group all reported knowing "some" Braille.

The only one of the fourteen who was taught to read Braille as a child said that she reads both print and Braille as an adult but uses print as her primary reading medium. She was one of the four who were employed in this group. Since this group contained thirteen PR subjects and only one BR subject, quantitative analysis of the data was not possible.

Instruction in Braille reading has traditionally 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 ($X2=6.045$; $p<.045$). (This finding also held true for its subjects in the larger study [$X2=7.648$: $p<.0218$].)

Contrary to common perceptions, more sight was not synonymous with a lower unemployment rate and financial independence in this study. The subjects who reported the least 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 non-disabled 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 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 early acquisition and extensive use 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 multi-disciplinary 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 under-served children with visual impairments. Teachers of children with visual impairments are typically expected to teach sixteen 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 does 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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