Individual Educational Programming: Assessing the Performance of Hearing-Impaired Students in a Variety of Settings

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This study was designed for the purpose of investigating the performance of 27 integrated hearing-impaired pupils on a test battery derived from assessment protocols most frequently reported in a survey of special education programs. A five-point rating scale was used by classroom and specialist teachers to obtain judgments of students' success in regular academic programs. Tests which distinguished children on the basis of perceived performance by school personnel are proposed as objective criteria for predicting the ability of hearing-impaired students to successfully mainstream in regular classrooms.

One of the major problems of PL 94-142 is that of "least restrictive alternative;" i.e., to the maximum extent possible, handicapped children receive their education with nonhandicapped students. This has resulted in the provision of a variety of educational settings for the placement of hearing-impaired children. It offered educators the challenge of designing individual programs for hearing-handicapped students and the responsibility of ensuring that hearing-impaired children were educated in environments that permitted students to develop to their potential.

In placing a hearing-impaired child in a learning environment, the critical question is, "Which educational placement will most effectively meet the needs of the child and provide the learning experiences which will enhance the child's abilities?" (Lennan, 1980). Social mainstreaming during nonacademic

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subjects such as music or physical education, for example, may be appropriate for one child while another may benefit from partial or full-time placement in a regular classroom. While the value of mainstreaming is recognized by educators (Guralnick, 1976; Reich, Hambleton, & Houldin, 1977), caution has been expressed relative to mainstreaming for the sake of mainstreaming (Bellefleur, 1974; Corbett, 1981). The student integrated into an inappropriate setting may experience failure and the devastating effects of the misplacement for years. It is imperative, however, that the pupil who can integrate successfully be given the opportunity to benefit from the experience of associating and working with hearing peers.

Educators have defined parameters which appear to be important in evaluating the potential of hearing-impaired children to be mainstreamed in regular classrooms. Academic ability and intelligence, language, reading and communication skills, auditory functioning, cognitive development, social and emotional maturity, and individual interests and abilities have been suggested as important variables in determining appropriate educational placement (Kopchick, 1977; Lennan, 1980; Neyhus, 1978; Nix, 1976). Although these factors have been identified and described, there is little information on the evaluation of these skills with respect to the integration of hearing-impaired children.

Accurate assessment is essential to ensure that the hearing-impaired child is integrated in an appropriate setting. Section 121a.346 of PL 94-142 specifies that evaluation procedures and objective criteria be used to determine that short-term goals are met (Dublinske, 1978). The results of these evaluations should provide educators with information helpful in the planning of individual educational programs and in the placement of children in appropriate learning environments. Much of the literature on mainstreaming to date, however, has focused on the rationale for integration, educational provisions, and program design (Birch, 1975; Nix, 1976; Northcott, 1973). Little specific information is known about current practices in the decision-making process regarding the integration of hearing-impaired children. In addition, objective measures of a student's ability to mainstream successfully into different integrated settings have yet to be established. Instead, the subjective judgments of teachers, supervisors, and parents often determine the mainstream status of a hearing-impaired child.

Subjective assessments have been used previously to evaluate students' academic performance. Birch and Birch (1956), in a study of the prediction of academic achievement in young hearing-impaired children, found that teacher ratings of children's intelligence not only corresponded highly with the performance of the students on the Leiter International Performance Scale but also with the future scholastic success of the pupils. These investigators concluded that teacher evaluations provided useful information regarding the future achievement of hearing-impaired pupils. Several subjec-

tive instruments have been designed to assess a candidate's potential for successful integration. Nix (1977), for example, devised a checklist which examined some of the factors considered to be important for mainstreaming. A subjective rating scale was used at the Lexington School for the Deaf (Blumberg, 1973) evaluated students' academic, communication, auditory, and social skills; parental support; and personality.

Despite the apparent accuracy of teacher judgments, however, rating scales are subjective and fail to provide information on the specific academic level at which students are functioning. A more objective instrument devised by Rudy and Nace (1973) examined the areas of intelligence, achievement, social adjustment, and hearing loss and arrived at a "transitional quotient" which was compared with a scale to judge the feasibility of integration for each candidate. Teacher subjective ratings comprised the score for social adjustment while values were assigned for objective scores received on formal evaluations in the other three areas.

The objective evaluation of hearing-impaired children also presents some specific problems for the teacher, educational psychologist, or other examiner who is evaluating the student. Few tests available today have been standardized on the hearing-impaired population; yet, out of necessity, these tools must be used with the hearing-impaired child. Some of the tests, however, may not be sensitive to the abilities, attitudes, or inclinations of the deaf (Garrison, 1979; Levine, 1971). Common problems in the administration of tests to hearing-impaired children have been identified by Rudner (1978). In examining tests which were standardized on the general population, Rudner found that some of the tests failed to evaluate items in the hearing-impaired curriculum, and the score a child received on an evaluation was not an accurate reflection of the knowledge acquired. Rudner also found that grade-equivalent scores could be meaningless and difficult to interpret for children in ungraded classrooms. In addition, other investigators noted that a larger variance characterized the scores of hearing-impaired as compared to hearing students (Anderson & Sisco, 1977). With respect to item appropriateness and test construction, reliability was usually lower for hearing-impaired students than for their hearing counterparts, thus increasing the measurement error of the scores. The use of certain syntactic structures and vocabulary items on evaluations has also placed the hearing-impaired child at a disadvantage when compared to hearing peers (McKee & Hausknecht, 1980).

Educators have attempted to modify assessment tools standardized on the hearing population by adapting test procedures to accommodate the special needs of the deaf and by developing norms with hearing-impaired subjects (Forde, 1977; Wrightstone, Aronow, & Moskowitz, 1963). Efforts to remediate some of the problems encountered in assessing the deaf have resulted in the standardization of the WISC-R (Anderson & Sisco, 1977) on deaf chil-

dren and in the development of the Standard Achievement Test-Hearing Impaired Edition (SAT-HI) for achievement testing (Trybus & Karchmer, 1977). Both Levine (1971) and Vernon and Brown (1964) suggested that a test battery was more appropriate for the hearing-impaired child. Still, the problem of evaluation has not been treated effectively.

In summary, accurate evaluation of hearing-impaired students is essential for planning individualized programs designed to foster the development of academic and communication skills. Although subjective teacher rating scales can provide useful knowledge, it is also necessary to have objective information to make placement decisions. However, no objective criteria which are known to be indicators of the potential of a hearing-impaired student to integrate successfully have been delineated. Little information is available on the performance of hearing-impaired children on most tests.

The intent of this study was to investigate the performance of hearing-impaired students on a number of different assessment tools used currently to determine students' potential for mainstreaming. In addition, the use of a rating scale to evaluate the achievement of hearing-impaired students was also examined. Specifically, we sought to identify those instruments which would distinguish students' abilities as perceived by their teachers. It was anticipated that the design of such a test battery would be useful in making objective decisions regarding student placement.

METHOD

Subjects

Subjects were 27 hearing-impaired pupils enrolled in grades three through ten in a large metropolitan public school district. The ages of the subjects ranged from 8 years 6 months to 17 years 1 month, with a mean age of 12 years 10 months. Seventeen subjects were females and ten were males. For the purpose of the study, three groups of hearing-impaired children were evaluated: (a) pupils mainstreamed full-time in regular classrooms with services from itinerant teachers one to two hours per week, (b) students partially integrated into regular classrooms for one or more academic subjects with daily services from resource teachers, and (c) students who were socially mainstreamed for nonacademic subjects. Nine of the subjects were mainstreamed full-time in regular classrooms, eight students were partially integrated, and ten students were socially mainstreamed. All students received academic instruction via the oral method of communication. Figure 1 shows mean hearing levels in the better ear for each of these three mainstreamed groups. As can be seen, the average thresholds of the three groups ranged from moderately severe in the low frequencies to severe in the high frequencies.

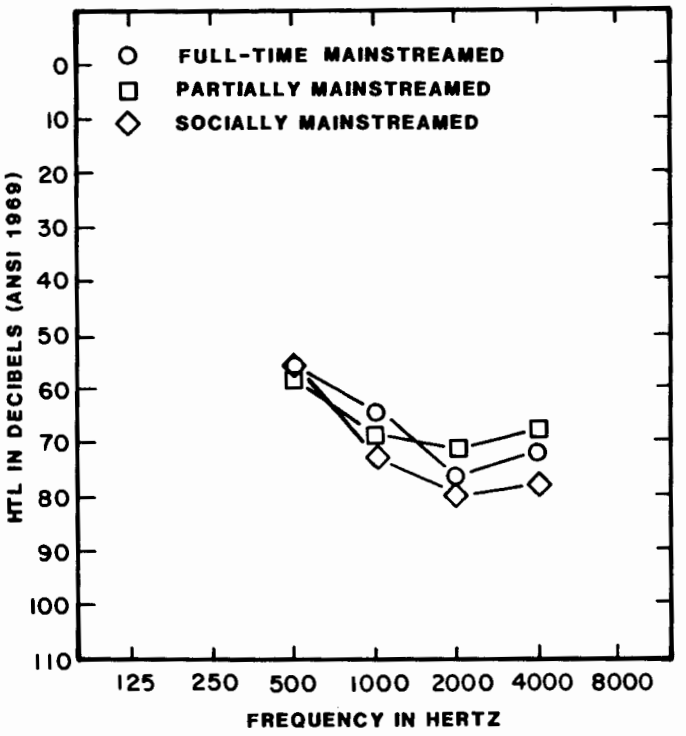

Figure 1. Mean hearing levels in the better ear for each of the three mainstreamed groups.

Procedure

Subjective assessment of hearing-impaired students. In order to obtain subjective judgments of pupils' success in academic programs and to confirm mainstream placement, the teacher of the hearing-impaired students and one regular classroom teacher of each hearing-impaired student completed a questionnaire about the pupil's performance (see Appendix). Teachers were asked to compare the child's performance to that of other students in the regular classroom with respect to academic achievement, communication skills, social maturity, and parental involvement. A 5-point scale was used to rate the student on each question: (a) Superior = 5 points, (b) Excellent = 4 points, (c) Good = 3 points, (d) Average = 2 points, (e) Fair = 1 point, and (f) Poor = 0 points. Scores were totalled for each teacher questionnaire. Possible scores ranged from 0 to 65 with observed scores for this sample of subjects ranging from 5 to 51.

Objective assessment of hearing-impaired students. In an attempt to establish which objective test measurements would be used in the evaluation procedure, a survey instrument was developed and sent to programs serving hearing-impaired students. Respondents were asked to list assessment tools administered to students regularly as well as those used specifically to evaluate a student's potential for integration into regular classrooms. Two hundred fifty programs listed in the April, 1979 *American Annals of the Deaf Directory* were surveyed, and 65 responses from 28 different states were received. Eighty-two percent of the respondents, or 53 of 65, represented day schools. Facilities using the oral method of communication and those using total communication comprised 35% of the respondents each, whereas 18% of the responses came from systems employing a dual-track program. For the most part, supervisors and administrators filled out the questionnaires. The assessment instruments listed most frequently by the respondents to the survey included the Stanford Achievement Test for Hearing Impaired Students (Office of Demographic Studies, 1972); the Ling Phonetic Level Speech Evaluation (Ling, 1976); the Peabody Individual Achievement Test (Dunn & Markwardt, 1970); the Peabody Picture Vocabulary Test (Dunn, 1965); the Carrow Elicited Language Inventory (Carrow, 1974); the Test of Syntactic Abilities (Quigley, Steinkamp, Power, & Jones, 1978); and the Key Math (Connolly, Nachtman, & Pritchett, 1970). Based on the results of this survey, a battery of tests was selected for administration to students in the present study. With respect to the Stanford Achievement Test (SAT), the subtests evaluated were those for which scores were available for all students. These included the Vocabulary, Word Study Skills, Mathematics Computation, and Communication Comprehension Subtests. Four subtests were administered from the Peabody Individual Achievement Test: Reading Comprehension, Reading Recognition, Spelling, and General Information. Although listed in the survey, it was not possible to evaluate the Test of Syntactic Abilities because the assessment could not be administered to all students. In addition, although not one of the instruments used frequently by the respondents to the survey, the Test of Auditory Comprehension (Audiologic Services & Southwest School for Hearing Impaired, 1976) was also administered to each student. This test was included because we thought it might provide useful information but simply has not been available long enough to be one of the more popular tools.

Table 1 shows the instruments used for the purpose of assessing communication and academic abilities. The qualities evaluated comprised many of the variables believed by educators to be important indicators of a student's potential to integrate. Speech ability was assessed using the Ling Phonetic Level Speech Evaluation, an imitation task in which the student was asked to repeat suprasegmental and segmental features modeled by the examiner. No standard system of scoring has been designed for this evaluation. Therefore,

Table 1

Assessment Instruments used to Evaluate
Communication and Academic Abilities

Profile Parameter	Assessment Instrument
Speech	Ling Phonetic Level Speech Evaluation
Audition	Test of Auditory Comprehension
Language	Carrow Elicited Language Inventory Communication Comprehension Subtest (SAT)
Vocabulary	Peabody Picture Vocabulary Test Vocabulary Subtest (SAT)
Reading	Reading Recognition (PIAT) Reading Comprehension (PIAT) Word Study Skills (SAT)
Mathematics	Key Math Mathematics Computation Subtest (SAT)
Other	General Information (PIAT) Spelling (PIAT)

the investigators devised one in which the student received one point for each speech phoneme or feature which was articulated correctly. Points were then totaled to derive a raw score. The Test of Auditory Comprehension, which evaluates auditory skills, assesses the student's ability to interpret environmental sounds, short sentences, and stories presented on tape. Again, a raw score was computed by summing points for each correct answer. The Carrow Elicited Language Inventory, a syntactically based language assessment, requires imitation of phrases and sentences. Points were computed for each incorrect answer and totaled to obtain a raw score. Because the Carrow was normed for children to age seven, raw scores were used to compare the students' performances. Tests using a forced-choice format evaluated the areas of vocabulary, reading, mathematics, general information, and spelling. In the Communication Comprehension Subtest (SAT), Peabody Picture Vocabulary Test, Spelling (PIAT), General Information (PIAT), and part of the Key Math, verbal stimuli were presented and the students were asked to choose the correct answer. Written stimuli were presented for the other tests: Vocabulary Subtest (SAT), Reading Recognition (PIAT), Reading Comprehension (PIAT), Word Study Skills (SAT), Mathematical Computation (SAT), and part of the Key Math. The tests were administered by teachers of hearing-impaired students and graduate students. Raw scores and, when possible, grade-level and age-equivalent percentile scores were also computed.

RESULTS

The teacher questionnaire was examined with respect to its effectiveness in evaluating the performance of hearing-impaired students with regard to their mainstream placement. A comparison between the ratings of the teachers of hearing-impaired students and the regular classroom teachers was also made. Finally, using discriminant analysis procedures, the objective assessment battery was analyzed in terms of its ability to predict the mainstream status of the students. Tests were selected which appeared to be the best predictors of students' placement.

Subjective Assessment of Hearing-Impaired Students

A plot of the ratings achieved by individual students on the questionnaire completed by the regular classroom teachers and the teachers of hearing-impaired students is shown in Figure 2. From the figure it can bee seen that

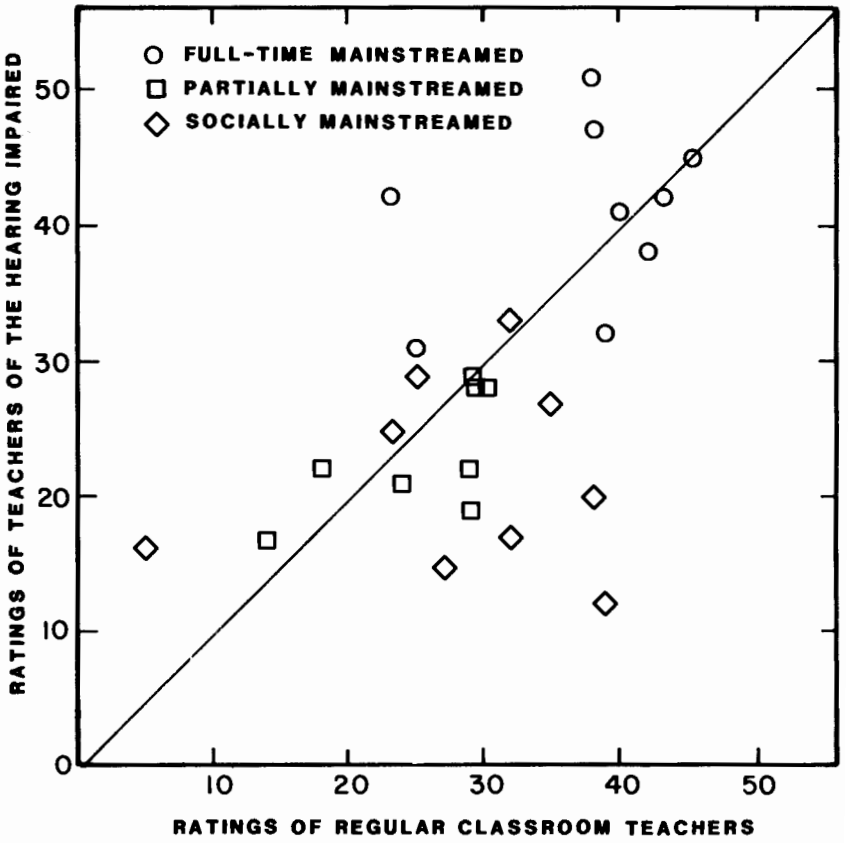

Figure 2. Ratings received from each teacher for individual students on the mainstream questionnaire.

there was fair agreement between teachers for many of the students. Since the number of points above and below the line were about equal, there was no tendency for either group of teachers to rate the children higher or lower as compared to the other group. With respect to the socially mainstreamed students, however, the ratings of the classroom teachers did tend to be higher than those of the teachers of hearing-impaired students. This was shown by the proportionately high number of diamonds in the lower half of the graph. In contrast, there was also some tendency for teachers of hearing-impaired students to rate full-time mainstreamed children higher than regular classroom teachers as shown by the circles in the upper left portion of the graph.

The correlation between the ratings of the teachers of hearing-impaired students and those of the regular classroom teachers was 0.63 ($p<.01$). A correlation of 0.63 is considered moderate-to-strong.

A plot of median ratings on the questionnaire answered by the two categories of teachers as a function of mainstream status is shown in Figure 3. The vertical bars represent the range of values observed. The ratings of the socially and partially integrated students overlapped considerably in contrast to those of the students mainstreamed full time which, in general, were higher than the ratings of the other two groups of students.

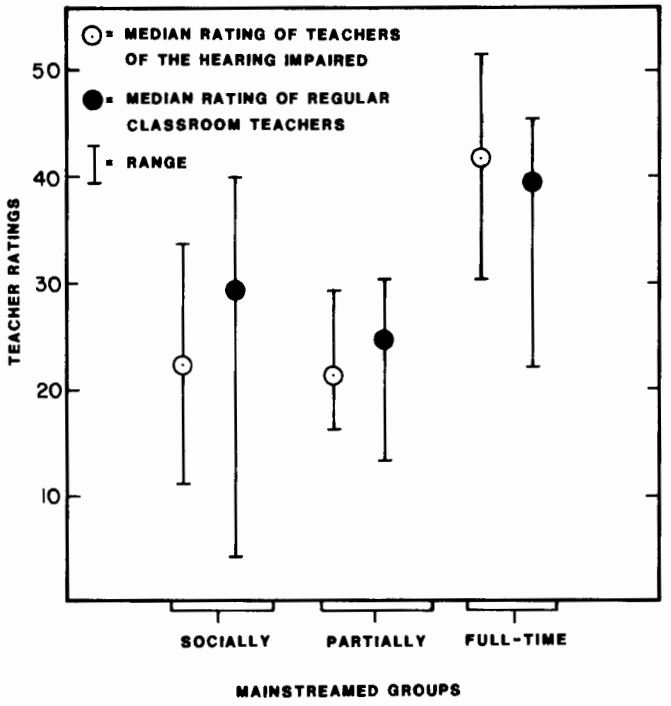

Figure 3. Median teacher ratings for each mainstreamed group.

Objective Assessment of Hearing-Impaired Students

A discriminant analysis was performed on the students' test results in order to ascertain the evaluation instruments which best predicted the mainstream placement of the students. The objective of the discriminant analysis is to "weigh and to linearly combine the discriminant variables in some fashion so that the groups are forced to be as statistically distinct as possible." (Klecka, 1975, p. 435). The discriminating variables were selected from the tests shown in Table 1. The Subtest Level of the Stanford Achievement Test was also selected as a discriminating variable because it is believed to be an indicator of general level of academic achievement.

Consistent with the analysis of the teacher ratings, which suggested that the social and partial mainstreamed groups could not be distinguished, a preliminary discriminant analysis attempting to sort out the three groups was unsuccessful. Differences in test performance between the socially and partially mainstreamed groups were defined less clearly as compared to the difference in performance between students mainstreamed full time and those not. As a result of this analysis, students who were socially and partially integrated were combined into one group of 18 students.

The second discriminant analysis attempted to distinguish the performance of the full-time and partially mainstreamed groups. Because two full-time students were missing values for one or more of the discriminating variables, their scores were excluded from analysis. Thus, the test results of 18 partially mainstreamed and 7 full-time students were compared in the analysis. The results of the analysis indicated that the following tests were useful in differentiating between the two groups: the Test of Auditory Comprehension, the Ling Phonetic Level Speech Evaluation, the Reading Comprehension Subtest (PIAT), the Word Study Skills and Communication Comprehension Subtests of the Stanford Achievement Test, and the Subtest Level of the Stanford Achievement Test.

Table 2 shows the linear equation that utilizes these variables to predict the placement of hearing-impaired students. In order to compute a student's discriminant score, which would then allow one to determine mainstream placement, the student's raw score on the Test of Auditory Comprehension was multiplied by .019. Added to that was the raw score received on the Ling Phonetic Level Speech Evaluation multiplied by -.021, the age equivalent percentile score on the Reading Comprehension Subtest multiplied by -.063, the age equivalent percentile score on the Word Study Skills Subtest multiplied by .030, the age equivalent percentile score on the Communication Comprehension Subtest multiplied by -.018, and the SAT Subtest Level multiplied by -.888. After the scores had been multiplied by the appropriate values and added together, a constant of 3.340 was then added to the sum, giving the student a discriminant score. An example of the use of the linear equation to predict a subject's discriminant function is presented in Table 3.

Table 2

Equation Factors for Six Assessment Instruments Utilized in the Calculation of Student Discriminant Scores Allowing Determination of Mainstream Placement of Hearing-Impaired Students

Equation Factors	Assessment Instruments
(.019)	Test of Auditory Comprehension
-.021	Ling Speech Evaluation
-.063	Reading Comprehension Subtest (PIAT)
.030	Word Study Skills Subtest (SAT)
-.018	Communication Comprehension Subtest (SAT)
-.888	SAT Subtest Level
3.340	Constant

Table 3

Test Scores on Six Assessment Instruments for a Single Student

Assessment Instruments	Student's Test Scores
Test of Auditory Comprehension	137
Ling Speech Evaluation	123
Reading Comprehension (PIAT)	91
Word Study Skills (SAT)	100
Communication Comprehension (SAT)	100
Subtest Level (SAT)	5

Calculation of the Discriminant Score for a Single Student

Equation Factors	Student's Test Scores	Equation Factors by Test Scores
.019	137	2.603
-.021	123	-2.583
-.063	91	-5.733
.030	100	3.000
-.018	100	-1.800
-.888	5	-4.440
Constant		3.340
Computed Discriminant Score		-5.613

One pupil's individual scores on the tests have been substituted for the variables and a discriminant score computed. This student received a score of 137 on the Test of Auditory Comprehension, which was multiplied by .019 equalling 2.603. The score of 123 on the Ling Phonetic Level Speech Evaluation was multiplied by -.021 yielding -2.583, and so on. The rest of the scores were treated similarly, and finally the constant of 3.340 was added to the sum, and a discriminant score of -5.613 was computed for this individual student.

Figure 4 shows a histogram of the results of the discriminant function with respect to the prediction of mainstream status for the students sampled in the

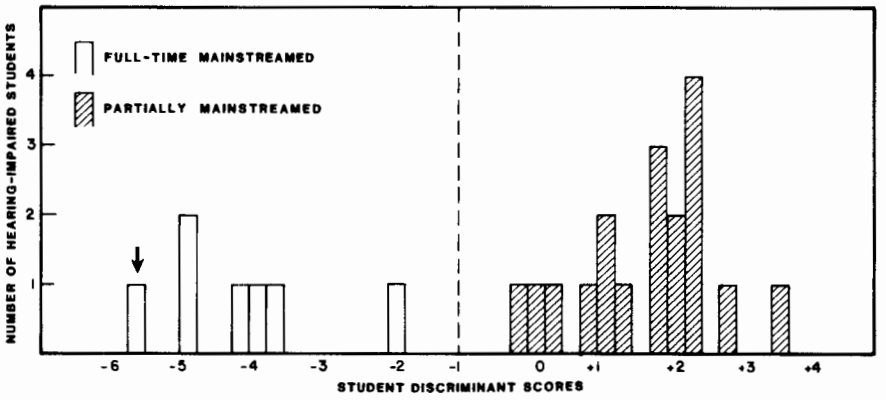

Figure 4. Results of the discriminant function with respect to the prediction of mainstream status. (Dashed vertical line at -1 is boundary separating partially mainstreamed (> -1) from full-time mainstreamed (<-1) students.)

study. The dotted vertical line is the statistical boundary between the two groups, located at approximately -1. That is, if the results of a student's scores substituted in the equation were less than -1, the student was placed in the full-time mainstream group. If the student's scores were greater than -1, placement was in the partially mainstreamed group. The discriminant score calculated for the student in the previous example in Table 3 is marked by an arrow on the graph. As one can see, the student was placed well within the range for full-time mainstreamed hearing-impaired students. One also notes that the function does indeed differentiate between the two groups. All seven full-time integrated students were classified to the left of the -1 boundary, while the partially mainstreamed pupils were placed to the right of the boundary. This is confirmed by examining the classification results in Table 4. One hundred percent of all cases were correctly classified using the formula.

Table 4
Classification Results

Mainstreamed Groups	Number of Subjects	Predicted Group Membership	
		Full time	Partial
Full time	7	100.0%	0.0%
Partial	18	0.0%	100.0%

DISCUSSION

The present study evaluated objective assessment tools with respect to their ability to distinguish the academic performance of social, partial, and full-time integrated hearing-impaired students. Also examined was the use of a subjectively scored teacher questionnaire to evaluate the academic achievement of the students. The results of both investigations indicated that it was possible to distinguish the performance of students who were mainstreamed full-time from that of pupils who were not integrated on a full-time basis. However, neither the questionnaire nor the objective test battery was able to distinguish the abilities of socially and partially integrated hearing-impaired students. With respect to the questionnaire, teachers of hearing-impaired students and regular classroom teachers rated the abilities of full-time mainstreamed students somewhat higher than the abilities of partially mainstreamed students. The lower scores of the partially or socially and partially integrated students, overlapped considerably. The results of the discriminant analysis verified the findings of the teacher ratings. Five tests were selected which objectively differentiated full-time from partially integrated students.

Differences in the academic skills required for social, partial, and full-time integration may explain the inability of the questionnaire and discriminant analysis to distinguish the three groups of hearing-impaired pupils. The skills of the students mainstreamed full-time were comparable in all academic areas to the skills of the normal-hearing students. Supportive services from itinerant teachers were limited to one to two hours per week. In comparison, both partially and socially integrated students received daily support services from special education instructors. While the achievement of partially integrated students in some subjects was at or near grade level, other academic areas required the close supervision of the resource teachers. The socially mainstreamed students received all academic instruction from the teachers of hearing-impaired students. Thus, the level of academic proficiency of the partially mainstreamed students might be expected to be more similar to that of the socially integrated pupils than to that of the full-time integrated students. It was perhaps this level of competency that both the subjective teacher rating scale and objective assessment battery were able to differentiate.

A comparison of the ratings of regular classroom teachers and teachers of hearing-impaired students revealed that the abilities of the socially and full-time integrated students were perceived somewhat differently by the two groups of teachers. While the ratings of regular classroom teachers with regard to socially mainstreamed students tended to be higher than those of the teachers of hearing-impaired students, the latter teachers tend to give higher ratings to full-time integrated students as compared to the ratings of regular classroom teachers. Although the correlation of .63 observed between the ratings of teachers of hearing-impaired students and regular classroom teachers is considered moderate-to-strong, the agreement between teachers was only fair because less than half of the variance was common to the ratings of both teachers; i.e., using the rating of one teacher to predict that of the other would account for only 40% of the variance.

The opportunities for teachers to observe and assess the skills of the hearing-impaired pupils may explain the differences in the teachers' opinions. For example, socially mainstreamed students were integrated for subjects like physical education and art which did not require sophisticated language facility. Since demonstration was part of the instruction in these courses, the hearing-impaired students were able to comprehend information even if communication skills were weak. It was relatively easy for hearing-impaired pupils to observe and follow the actions of the other students. Teachers exposed to hearing-impaired students in social mainstream placements may not have been knowledgeable of the effects of hearing loss on communication abilities. Large (1981) emphasized that the "hidden handicap" of deafness can be detrimental because the teacher is not immediately aware of a student who requires special attention. The teachers of socially mainstreamed students may have perceived the pupils as performing well the requirements of the course and assumed, in rating the students, that academic and communication skills were also adequate. The teachers of hearing-impaired students, however, worked with the socially mainstreamed students to develop academic and communication skills and perhaps judged more accurately the skills of the students.

In comparison, the full-time mainstreamed students were integrated into academic subjects which required the students to participate in classroom discussions, question and answer periods, daily assignments, and written reports and tests. This participation afforded regular classroom teachers sufficient opportunities to evaluate the communication and academic skills of the full-time mainstreamed hearing-impaired students. The itinerant teachers of hearing-impaired students rarely observed mainstreamed students in the classrooms and relied on the pupils and classroom teachers to delineate skills which required rehearsal. There were few opportunities for the itinerant teachers to compare the performance of hearing-impaired students with that of normal-hearing pupils.

Both findings suggest the need for closer contact between regular classroom teachers and teachers of the hearing impaired. The results also indicate that improvements in the subjective rating scale are warranted. It might be appropriate to devise a questionnaire which focuses on the skills expected of the students in each educational setting. For the socially integrated student, questions might center on general communication abilities and interaction patterns, while for partially and full-time integrated pupils, questions on academic skills could comprise the body of the questionnaire.

Results of the discriminant analysis revealed that objective criteria could be identified which distinguished full-time from partially integrated pupils. The five tests selected as distinguishing variables represented a range of academic and communication skills considered by educators to be important in determining mainstream placement. Auditory, speech, reading, and oral comprehension abilities were evaluated by the test battery. With the exception of the speech evaluation, all other assessment tools evaluated some aspect of linguistic ability. The findings of the present study confirmed that, for hearing-impaired students, excellent language skills are critical for achieving success in mainstream placements. The sixth discriminating variable, Subtest Level, of the Stanford Achievement Test, indicated that a general overall level of proficiency was required for integration. As discussed previously, differences in academic skills and support services distinguished full-time pupils from partially and socially mainstreamed pupils. It was suggested that the questionnaire and analysis differentiated between these two groups with respect to these differences. The fact that Subtest Level was included in the analysis as a discriminating variable lends support to this conclusion.

Although objective criteria for placement were established, the limitations of the study must be carefully considered. A small group of hearing-impaired students (ages 9 to 17 years) were evaluated, and the use of the discriminant function to evaluate performance and predict mainstream status is limited to this age range. Further research is necessary to validate the results with a larger sample of students and to develop a battery of tests for evaluating hearing-impaired children in the early elementary grades. Future studies may also explore the use of the assessment battery with children using total communication to ascertain if the formula requires modification for use with this group of students.

The present study focused on the evaluation of academic achievement, only one of several important factors to be considered when determining educational placement. Research is needed to explore the relationship between academic skills and affective variables and to develop instruments which measure these variables as objectively as possible.

In summary, our results suggest that it is possible to objectively assess the academic achievement of hearing-impaired students and predict mainstream placement. Subjective teacher ratings also appear to judge fairly well the

placement of hearing-impaired students. There is a need for future research to further explore the factors important in determining placement and, if possible, to objectively evaluate these factors. The challenge of designing individual programs for hearing-impaired students can be met through accurate assessment of the skills required for successful integration into different mainstream settings.

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APPENDIX

TEACHER QUESTIONNAIRE

The Bill Wilkerson Hearing and Speech Center is involved in a study on hearing-impaired children who are mainstreamed full or part time. We are interested in your judgment of _____ and her/his performance in a regular hearing classroom. Your answers will be combined with those of other teachers and averaged to derive a score for this student. This score will be compared to test results from several diagnostic assessments. We are interested in seeing if the assessments reflect the teachers' judgments of a student's performance.

To fill out the questionnaire, put an X after the word that best describes your judgment of this student's performance. Please answer *all* questions.

Student's age _____

Grade level _____

1. In comparing this student with other students in the regular classroom
   a. I would rate her/his reading ability as
   Superior _____ Excellent _____ Good _____ Average _____ Fair _____ Poor _____
   b. I would rate her/his mathematical ability as
   Superior _____ Excellent _____ Good _____ Average _____ Fair _____ Poor _____
   c. I would rate her/his ability to successfully complete assignments in content areas (i.e., science, social studies) as
   Superior _____ Excellent _____ Good _____ Average _____ Fair _____ Poor _____

2. I would assess this student's speech intelligibility as
   Superior _____ Excellent _____ Good _____ Average _____ Fair _____ Poor _____

3. I would assess her/his linguistic skills to be
   Superior _____ Excellent _____ Good _____ Average _____ Fair _____ Poor _____

4. I would rate her/his overall academic ability to be
   Superior _____ Excellent _____ Good _____ Average _____ Fair _____ Poor _____

5. I would rate her/his overall intelligence as
   Superior _____ Excellent _____ Good _____ Average _____ Fair _____ Poor _____

6. This student's ability to use her/his hearing to understand information and directions is
   Superior _____ Excellent _____ Good _____ Average _____ Fair _____ Poor _____

7. This student's lipreading ability is
   Superior _____ Excellent _____ Good _____ Average _____ Fair _____ Poor _____

8. Support services might include private tutoring, itinerant service, a resource room, as well as audiological services. I would judge this student's support services to be
   More than adequate _____ Adequate _____ Inadequate _____

9. Parental support for this student and her/his current needs is
   Superior _____ Excellent _____ Good _____ Average _____ Fair _____ Poor _____

10. In comparing the social maturity of this student with others in the regular classroom, I find her/him to be
    Very Mature _____ Mature _____ Average _____ Immature _____

11. I would assess this student's ability to communicate with other students as
    Superior _____ Excellent _____ Good _____ Average _____ Fair _____ Poor _____

12. In my judgment this student is a _____ candidate for successful full-time integration in a regular classroom.
    Superior _____ Excellent _____ Good _____ Average _____ Fair _____ Poor _____