Academic Achievement of Third Grade Students Who Failed First Grade Hearing Screening Tests

Summer 1981

Catherine A. Cowan

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ACADEMIC ACHIEVEMENT OF THIRD GRADE STUDENTS
WHO FAILED FIRST GRADE HEARING SCREENING TESTS

BY

CATHERINE-ANN COWAN
B.A., University of South Florida, 1977

THESIS

Submitted in partial fulfillment of the requirements for the Master of Arts degree in Communicative Disorders in the Graduate Studies Program of the College of Health University of Central Florida
Orlando, Florida

Summer Term
1981
Acknowledgment

I would like to express my appreciation to my thesis committee members, Dr. Bruce E. Mathews, Dr. Raphael R. Kavanaugh, Jr., and especially Dr. Doris P. Bradley, who always showed a personal as well as professional interest in the completion of my graduation requirements.

I am grateful to the Brevard County School System, particularly those Principals, Speech Clinicians and other personnel who aided in the extensive compilation of data necessary for this study.

A special word of appreciation and thanks needs to be expressed to James E. Holmes, Incorporated for their support and especially to Russell Holmes, who dedicated long hours keeping my spirits high, my stomach filled and my fingers working.

Finally, I would like to thank Dr. Thomas Mullin for his initial support of my graduate endeavor, his solid belief in my abilities and his gentle encouragement to follow my dream.
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Introduction

Hearing loss is one factor that plays a pivotal role in a student's personal and educational adjustment (Karchmer, Milone, & Wolk, 1979). Several factors influenced by hearing loss are the intelligibility of speech, communication methods and the need for use of a hearing aid. These are based on the hearing levels of students.

According to Clark (1981) adjective descriptors of hearing loss appear to be the classification scheme preferred by most audiologists. There are numerous descriptive labels endorsed by and used in the audiology profession. The classification system shown in Table 1 was compiled from those generally accepted and widely utilized by audiologists (Katz, 1978; Goodman, 1965; Berg, 1976; & Clark, 1981).

These adjective descriptors usually are based upon a pure tone average (PTA) of the hearing threshold levels at the frequencies 500, 1000 and 2000 Hz, which are generally considered the most important for speech perception.

A student's educational placement and subsequent achievement are related to the severity of their hearing loss. For example, Karchmer et al. (1979) reported that residential schools for the deaf contain mostly profoundly deaf children. Day schools accommodate both profound and severely deaf students and integrated
<table>
<thead>
<tr>
<th>Average Hearing Threshold</th>
<th>Hearing Level Labels</th>
</tr>
</thead>
<tbody>
<tr>
<td>-10 to 15</td>
<td>Normal Hearing</td>
</tr>
<tr>
<td>16 to 25</td>
<td>Slight Hearing Loss</td>
</tr>
<tr>
<td>26 to 40</td>
<td>Mild Hearing Loss</td>
</tr>
<tr>
<td>41 to 55</td>
<td>Moderate Hearing Loss</td>
</tr>
<tr>
<td>56 to 70</td>
<td>Moderately Severe Hearing Loss</td>
</tr>
<tr>
<td>71 to 90</td>
<td>Severe Hearing Loss</td>
</tr>
<tr>
<td>91 +</td>
<td>Profound Hearing Loss</td>
</tr>
</tbody>
</table>
programs tend to serve primarily students with moderate and mild hearing losses. According to a study by Sheperd, Davis, Gorga, and Stelmachowicz (1981), as hearing loss increases, so does the variety of placement options. Less than ten percent of the children in their study with severe to profound hearing losses were placed in regular classrooms without assistance from a teacher for the hearing impaired.

Recently Public Law 94-142 (U.S. Code Service, 1976) has mandated appropriate classroom placement of all children in free public education. This federal law dictates that educators have a primary responsibility to strive for the most appropriate, least restrictive environment which will be most advantageous for each student's particular learning ability.

Hearing impaired students' educational needs are served in the following settings - (a) residential schools, a twenty-four hour, live-in situation, (b) day schools, a regular eight hour school day or special class for all hearing impaired, live at home, (c) self contained classrooms, regular school day, hearing impaired class in regular public school, (d) resource classrooms, part-time in regular class, (e) mainstreamed classrooms, some classes with hearing impaired some with regular hearing students, and (f) regular classrooms, all classes with regular students, itinerant tutoring services provided.

Often, if an auditory problem is not discovered, parents will adopt an unnecessarily low level of expectancy about their child's achievement (Gaith & Lounsbury, 1966). The child might resort to
some deviant means of compensatory behavior, which might have been avoided if the hearing problem had been identified early.

The severity of a child's hearing impairment depends, of course, on what caused the loss in the first place (Karchmer et al., 1979). Possibilities for sensori-neural, nerve damaged, or permanent hearing impairment have been reported to be a result of maternal rubella, hereditary factors, meningitis, mumps, infections, trauma, or otitus media. It becomes crucial to identify these impairments as early as possible. The extent of the hearing loss should be known early in a student's academic career to insure their proper school placement and to provide them the greatest chance for achievement.

A study done by Karchmer et al. in 1979 compared results on a standardized achievement test among a deaf population. They indicated very clear patterns among three hearing loss categories. The median scores of students with less than severe losses were superior at each age level to the scores of the students with more significant hearing impairments. The advantage was, on the average, between one-half and one grade equivalent.

Subjects with mild sensori-neural hearing losses have been shown to be inferior to normally hearing subjects in many areas, but particularly in auditory discrimination (Goetzinger, Harrison, & Baer, 1964). In a study by Gaeth (1966), it was found that children with losses not exceeding 30 decibels (mild loss) were deficient in all forms of auditory learning.
Educational Effects of Hearing Loss

Several learning characteristics have been related to hearing impairment. Failure to learn various required skills generally results from auditory deficits and not cognitive ones.

Goetzinger et al. (1964) reported that a mild bi-lateral sensori-neural hearing loss of 20 to 35 decibels for the speech frequencies of the better ear existing from birth or prior to acquisition of language, induces language and speech retardation of about twelve months at chronological age, three years. Auditory discrimination, which tends to improve minimally with age, rarely reaches the same level as in children with normal hearing.

Hearing impaired children tend to repeat more school grades than normal hearing children. In fact, according to Goetzinger et al. (1964) the hearing impaired child is altogether educationally retarded.

Kodman (1963) tested educational achievement of 100 hearing impaired children in Kentucky and found an average deficit of 2.24 years. These same children had repeated a total of 57 grades in school. According to Berg (1976), this academic gap between hearing impaired children and normal hearing children increases with age. For example, a one year retardation in the fourth grade might become a two year deficit by the eighth grade and a three year gap by the twelfth grade.

Kodman (1963), Quigley and Thomure (1968), Davis (1974), and Peterson (1972) have reported that hearing impaired children
are underachievers, delayed in academic skills and are subsequently in jeopardy regarding their social relationships.

The social position of hearing impaired children in Tennessee, was examined by Elser (1959). These students did not score as high in friendship and reputation and were not as well accepted as their normal hearing peers.

The hearing impaired child enrolled in regular schools is often labeled as uncooperative, mentally defective, or emotionally disturbed (O'Neill, 1964). If his hearing loss goes undetected, he gradually loses out in competition both academically and socially. In addition, teachers in regular schools are quick to comment about poor work habits, poor attitudes and emotional variability among hearing impaired students.

In an unpublished hearing survey of the Kansas City, Missouri Public School System, Baer and Anstaett (Note 1) reported the prevalence of hearing impairment as being 2.25% of the total population on which hearing tests had been made. Since language abilities of the hearing impaired might tend toward retardation, as compared to normals, that 2.25% becomes a very important population to identify. As noted by Goetzinger et al. (1964) there is some evidence to suggest that children with mild hearing losses represent the largest proportion of those children with defective hearing in the public schools. Children with mild hearing losses appear to function less effectively than children with normal hearing, irrespective of some apparent compensation through lipreading.
Further, a conductive hearing loss, involving the middle or outer ear components, will unnecessarily close off essential avenues to learning as well. Undetected middle ear pathology may lead to additional and serious problems in both health and education. Most impairment due to conductive components can be significantly reduced, avoided, or eliminated altogether with early detection, appropriate treatment and careful follow-up. Most external or middle ear problems resulting in conductive loss can be corrected by a variety of medical and or surgical procedures. However, before such problems can be treated, they must be detected and diagnosed. Even though a drop in hearing may be present, without systematic detection procedures, conductive hearing loss may well go unnoticed.

Both medical and educational complications from otitus media alone have been reported in the literature (Bluestone & Shurrin, 1974; Katz, 1978). Unresolved infections may cause permanent middle ear damage or may spread from the middle ear into the mastoid or even the cranial cavity (Craig, Stool, & Laird, 1979). As an educational consequence of recurring middle ear disease such as otitus media, with its attendant fluctuating loss of hearing, otherwise normal hearing children have been reported to have significant generalized speech and language problems.

Hearing impaired children also experience negative feelings about themselves, including embarrassment, confusion, annoyance and helplessness associated with their difficulty in localizing and understanding speech. These feelings occur most often in sit-
uations where the persons around them are not aware of the child's hearing loss (Giolas & Wark, 1967). Much of the rejection the hearing impaired child feels is from his failure to hear requests made of him or from his attempts to bluff his way through various situations (Wright, 1960).

Vernon (1970), a clinical psychologist, described hearing impaired children as becoming "masters of the neutral response" (p. 224), smiling, saying yes, occasionally nodding their heads. He also noted that hearing impaired youngsters will either keep altogether quiet at the one extreme or try to dominate a conversation at the other extreme to avoid having to understand that which is unclear. Finally, Simmons (1971) stated that delayed identification of hearing loss prolongs the time it takes a child to progress through the various stages of normal language development.

There is often relatively late identification of children with hearing losses. According to Matkin (1980) it is usually only after a child fails many developmental milestones in communication that parents initiate a referral for proper testing. Often there is a nine to twelve month delay from the first statement of concern by parents to the first formal evaluation even in instances of severe and profound bi-lateral impairments (Malkin, Freeman, & Hasting 1976; Matkin, 1973). With milder degrees of hearing impairment, it is not uncommon to see delays of one to two years. In fact, many impairments are not identified at all, until the
child undertakes his first pure tone screening in the public school (Matkin, 1980).

Adequate testing and follow-up procedures make it possible to detect these problems early, to monitor their progress and to offer treatment where needed through referral which should prevent their development into problems with even more major medical and educational impact.
Statement of the Problem

The purpose of this study was to describe the academic achievement of two groups of students identified by hearing screening tests and given medical referrals for follow-up. Group I was comprised of students who went for medical follow up as suggested by the audiologist. Group II was made up of those students who did not seek medical follow-up.

Hearing screening programs in many public schools begin with identification audiometry. This might include simple pure tone air conduction testing and/or impedance testing to identify any gross ear pathology or hearing loss among children (Berg, 1976). For example in Illinois, state laws mandate that the school system must provide an annual hearing screening for children in grades Kindergarten through third, then in fifth, seventh, ninth and eleventh. Also, it is administered to students receiving special support services, those already identified as hearing impaired, new students and pre-school children enrolled for educational programming (Shattuck, 1973).

In Brevard County, Florida similar guidelines are followed. Students in kindergarten first and third grades are given pure tone air conduction hearing tests. Those students already enrolled in hearing impaired programs as well as pre-school children enrolled in public school programs are also tested.
When a child needs more than 20 decibels (dB) of sound in the speech frequencies (500, 1000, and 2000 Hz) to respond, or needs greater than 25 dB in any of the other frequencies tested (250 Hz-8000 Hz) to respond, he or she is then re-tested a week to ten days later to rule out the possibility of a fluctuating hearing loss. Such losses are often temporary and are considered conductive due to colds, sinus problems or ear infection. If the student fails this second hearing evaluation, the audiologist then recommends an appointment with an otologist for medical attention and further testing.

Expense to the school system in terms of personnel time is great. Expense to parents in terms of time and money is sizable.

The effects of follow-up on educational achievement is not well documented in the literature.

The need for such information is evident. This study was designed to obtain information related to school achievement and its relationship to medical referral after hearing screening.
Subjects

Subjects were composed of seventy-five students from eleven schools whose hearing was tested in the first grade in the routine school hearing screening during the 1978-1979 school year. These students were identified at that time as having a hearing problem needing medical referral as determined by the audiologist. Criteria for referral included an audiogram below normally accepted limits (25-30 dB) in the speech frequencies; reduced bone conduction thresholds; bone conduction thresholds significantly different (10 dB) from air conduction thresholds in the speech frequencies; reduced speech discrimination score (below 85%) correct; or unusual physiological findings upon otoscopic examination of the external auditory meatus. Any of the above findings in combination indicated reason for medical referral. These students were referred, in writing, to an otologist for medical examination and disposition.
Methods

After hearing testing, the school audiologist referred for medical evaluation and treatment by notifying the student's parents that the hearing test was failed and their child needed to see a physician. The purpose of medical follow-up is to prevent educational delays and failures.

A copy of the notification and the hearing test results were placed in the child's school record. Some parents took their child to a physician who then sent the results of his evaluation and/or treatment to the school audiologist or to appropriate school personnel in the Department of Exceptional Student Education. This information was placed in the child's school cumulative record. Some parents did not go to the physician so no treatment information was filed.

Each elementary school speech clinician retained records at his or her school including information as to whether or not a student was attended by a physician. Such records were examined to determine which students who were identified with medical problems in the first grade were still attending school in Brevard County (1980-1981) school year and presently enrolled in the third grade. Students were selected on the basis of written record rather than by verbal statement of medical attention.
Information regarding the subjects' academic achievement was obtained from the Florida Statewide Assessment Test scores. The Florida Statewide Assessment Test is routinely administered to all third grade students in the State of Florida. Those students who were retained at either the first or second grade level would not have taken the exam, but the fact of their retention would have been recorded in the final tabulation of test score results as failing a grade may have proven to be a relevant factor in the outcome of this study.

The Florida Statewide Assessment Program (1976), which began in 1971 assesses student's academic strengths and weaknesses, particularly in the basic skills areas. The Standards, are simply broad performance objectives which usually have from one to six sub-skills. The Florida Statewide Assessment Test was chosen as the measurement tool for this study due to its standardization and simplicity in score interpretation.

Assessment results describe student achievement of the minimum performance standards, and skills which comprise each standard. In most cases a standard is defined by one, two or three skills. A student is considered to have mastered a skill and standard when he or she has answered correctly a certain minimum number of items. Individual student reports are provided that indicate whether a student masters the various skills and standards. It is from these reports that a pass/fail criterion of the basic standards were determined for this study.
A total number of correct standards and subsequent skills were tabulated for each child.

Administration of the Florida Statewide Assessment Exam was monitored by the individual classroom teachers and controls adhered to as stipulated in the regulations. Exams are computer scored and reported, thereby alleviating human error in tabulation of results.

At the third grade level, it is possible to pass a total of fifteen (15) standards on the Florida State Assessment Test. Included under those fifteen standards are twenty-nine (29) possible skills - ten (10) in Reading, five (5) in Writing and fourteen (14) in Mathematics.

Relationships between performance on hearing tests and academic achievement have not been documented previously. Presently it is not known if children who receive medical follow-up achieve better academic scores than those who do not.
Results

Subjects in this study were students identified for the investigator by speech clinicians of elementary school students in Brevard County, Florida. A letter of explanation (see Appendix A) was initially sent to all Speech/Language clinicians requesting a list of students who failed first grade hearing screening during 1978-1979 school year and who were referred medically. These students should have completed Grade three in 1980-1981 school year. Also, it was requested that clinicians indicate on this list which students had gone to the doctor and which students had not. From this initial list a search was conducted through students' cumulative folders at their respective schools to determine which students were still living in Brevard County, Florida.

There were 75 students at eleven schools who qualified for utilization in this study. Group I consisted of 30 students representing those who had sought medical attention. Another 30 students were placed in Group II, representing those who had not sought medical attention. The remaining 15 students had been retained in either first or second grade and so were not in the third grade during the 1980-1981 school year. Subsequently these students had not taken the Florida Statewide Assessment Test and therefore scores were not available for this study. The fact of their retention was noted however, and pro-
vided some interesting information.

In the 1978-1979 school year there was a total of 3,075 first graders in Brevard County, Florida. Among these, 375 or 12% were retained that year. In the 1979-1980 school year there was a total of 3,066 second graders in Brevard County and 175 or six percent were retained. Over this two year period an overall average of nine percent of Brevard County's first and second graders were held back a grade. This two year span would account for students who did not qualify for this study.

In Group I those seeking medical attention, three, (9%) were retained. This nine percent average matches the overall retention rate for the entire county population in this age group. However, in Group II, those students who did not seek medical attention, 12, (28%) were retained. Twenty percent of all students who failed hearing screenings were retained.

A chi square test (Spence, Underwood, Duncan, & Cotton, 1968) was used to determine if a significantly greater number of students failed in Group I than in Group II. The obtained $X^2=5.4$, df=1, was significant at the .05 level.

The Communication section of the Florida Statewide Assessment Test consisted of two sections - a Reading section including nine standards and 10 possible skills and a Writing section, including four standards and five possible skills.

Students scores were noted in a pass/fail manner for each student on each item tested. Percentages of students passing
each skill in each group were compared with the percentage of students passing each skill county-wide. Under the main category of Communication, in Reading – a higher percentage of the Group I subjects failed seven of the 10 skills than the total school population. A greater percentage of subjects in Group II failed eight of the ten skills than the general population. In both groups, a higher percentage of subjects passed the five writing skills than the total school population.

The Mathematics section of the Assessment Test had only one section, consisting of nine standards and 14 possible skills. Students scores again were reported in an identical pass/fail manner. Percentage of students passing each skill were tallied and compared in a like manner. The percentage of subjects in Group I who failed Mathematics skills was greater in six of the 14 skill areas than the percentage of the total school population. The percentage of subjects failing the mathematical skills was higher in Group II than in the general school population for four of 14 skills (see Tables 2 and 3).

In general, both those students who failed hearing tests and were medically referred and all students of Brevard County did well on all sections of the Florida Statewide Assessment Test. However, a reduced number of students in both Groups I and II did not pass Communication skill H8 "Identify story outcomes". Only 73.3% of Group I achieved this skill and 73.6% of Group II achieved this skill, compared with 92.0% achieve-
Table 2
% of Students Passing Florida Statewide Assessment Communication Skills

<table>
<thead>
<tr>
<th>Reading</th>
<th>Brevard Cty.</th>
<th>Group I</th>
<th>Group II</th>
</tr>
</thead>
<tbody>
<tr>
<td>A 1  Identify words</td>
<td>99.0</td>
<td>100.0</td>
<td>100.0</td>
</tr>
<tr>
<td>A 2  Associate words</td>
<td>99.0</td>
<td>100.0</td>
<td>100.0</td>
</tr>
<tr>
<td>C 4  Associate contractions</td>
<td>96.0</td>
<td>100.0</td>
<td>93.3</td>
</tr>
<tr>
<td>F 6  Identify details</td>
<td>96.0</td>
<td>86.6</td>
<td>93.3</td>
</tr>
<tr>
<td>G 7  Determine effect</td>
<td>97.0</td>
<td>73.3</td>
<td>90.0</td>
</tr>
<tr>
<td>H 8  Identify story outcomes</td>
<td>92.0</td>
<td>73.3</td>
<td>77.6</td>
</tr>
<tr>
<td>I 9  Distinguish reality</td>
<td>94.0</td>
<td>93.3</td>
<td>90.0</td>
</tr>
<tr>
<td>J 10 Identify irrelevance</td>
<td>84.0</td>
<td>93.3</td>
<td>83.3</td>
</tr>
<tr>
<td>K 12 Follow written directions</td>
<td>88.0</td>
<td>86.6</td>
<td>86.6</td>
</tr>
<tr>
<td>M 14 Alphabetize words</td>
<td>90.0</td>
<td>73.3</td>
<td>86.6</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Writing</th>
<th>Brevard Cty.</th>
<th>Group I</th>
<th>Group II</th>
</tr>
</thead>
<tbody>
<tr>
<td>B 2  Classify objects</td>
<td>98.0</td>
<td>100.0</td>
<td>100.0</td>
</tr>
<tr>
<td>B 3  Sequencing pictures</td>
<td>98.0</td>
<td>100.0</td>
<td>100.0</td>
</tr>
<tr>
<td>C 4  Dictate sequential events</td>
<td>89.0</td>
<td>93.3</td>
<td>90.0</td>
</tr>
<tr>
<td>G 9  Identify correct spelling</td>
<td>98.0</td>
<td>100.0</td>
<td>100.0</td>
</tr>
<tr>
<td>I 13 Capitalize in sentences</td>
<td>98.0</td>
<td>100.0</td>
<td>100.0</td>
</tr>
</tbody>
</table>

Note. See Appendix B for complete description of skills.
Table 3

% of Students Passing Florida Statewide Assessment Mathematics Skills

<table>
<thead>
<tr>
<th>skill description</th>
<th>Brevard Cty.</th>
<th>Group I</th>
<th>Group II</th>
</tr>
</thead>
<tbody>
<tr>
<td>A 1 Count up to 100 objects</td>
<td>99.0</td>
<td>100.0</td>
<td>96.6</td>
</tr>
<tr>
<td>B 2 Read and write numbers</td>
<td>99.0</td>
<td>100.0</td>
<td>100.0</td>
</tr>
<tr>
<td>E 7 Identify 1/2, 1/3, 1/4</td>
<td>88.0</td>
<td>93.3</td>
<td>96.6</td>
</tr>
<tr>
<td>F 9 Add three 1-digit numbers</td>
<td>99.0</td>
<td>100.0</td>
<td>100.0</td>
</tr>
<tr>
<td>F10 Add two 2-digit numbers</td>
<td>95.0</td>
<td>93.3</td>
<td>96.6</td>
</tr>
<tr>
<td>G12 Subtract combinations</td>
<td>86.0</td>
<td>80.0</td>
<td>83.3</td>
</tr>
<tr>
<td>G13 Subtract 1-digit numbers</td>
<td>92.0</td>
<td>86.6</td>
<td>86.6</td>
</tr>
<tr>
<td>G14 Subtract 2-digit numbers</td>
<td>89.0</td>
<td>86.6</td>
<td>96.6</td>
</tr>
<tr>
<td>O17 Tell time - hour &amp; ½-hour</td>
<td>89.0</td>
<td>100.0</td>
<td>100.0</td>
</tr>
<tr>
<td>O18 Determine object length</td>
<td>95.0</td>
<td>100.0</td>
<td>96.6</td>
</tr>
<tr>
<td>O20 Identify sets of coins</td>
<td>94.0</td>
<td>100.0</td>
<td>100.0</td>
</tr>
<tr>
<td>T21 Solve &quot;+&quot; word problems</td>
<td>96.0</td>
<td>100.0</td>
<td>100.0</td>
</tr>
<tr>
<td>T22 Solve &quot;-&quot; word problems</td>
<td>94.0</td>
<td>93.3</td>
<td>80.0</td>
</tr>
<tr>
<td>V24 Money problems under 50¢</td>
<td>79.0</td>
<td>86.6</td>
<td>93.3</td>
</tr>
</tbody>
</table>

Note. See Appendix C for complete description of skills.
ment for the entire student population. Communication skill M14, "Put words in Alphabetical order by 1st letter" was another skill in which both Groups I and II were low. Only 73.3% and 86.6% of Groups I and II respectively passed this skill compared to 90% of the entire county population.

There appeared to be no difference between Groups I and II on Total number of items correct in Communication. Out of a possible 80, Group I had a mean correct of 74 and Group II, 73. For total skills achieved, Group I averaged 13.7 of 15 and likewise, Group II averaged 13.9. Finally, total standards achieved - the mean for Group I was 11.4 out of a possible 13, compared with a mean of 11.9 for Group II.

In the Mathematics area the total number of items correct for both groups was identical - 1908, therefore rendering identical means of 63.6 of a possible 68. Mean number of skills achieved was 13.2 of a possible 14 for both groups and the mean number of standards achieved was 8.6 of a possible nine for both groups.
Discussion

Although based on a small sampling of subjects, results plainly showed that more children who had not sought medical attention failed either the first or second grade. In fact nine more children repeated a grade in their first two school years than might have repeated had they received medical follow-up.

These findings are in agreement with Goetzinger et al. (1964) who maintained that the hearing impaired child is altogether educationally retarded. Also consistent with these results are those of Kodman (1963). He found an average deficit of 2.24 years in Hearing Impaired children and stated they repeated more grades in school than the normal child. Kodman (1963), Quigley and Thomure (1968), Davis (1974), and Peterson (1972) have reported that hearing impaired children are underachievers and delayed in academic skills. This proved true in the current study for those students who did not seek medical attention.

Based on the cost to educate each child per academic year in schools of Brevard County, Florida in the 1979-1980 school year, the County spent $15,579.00 more than they would, had these nine children passed their grades. The 1979-1980 cost per child per academic year was $1,731.00.

In addition to the monetary consideration of taxpayers, possible cost to the child regarding self-confidence, self-esteem
and personal image needs to be considered. Medical follow-up might have prevented these additional failures.

It is important to note that the children who were utilized for this study were at the mildest end of the continuum regarding severity of hearing loss. Goetzinger et al. (1964) maintained that children with mild hearing losses represented the largest proportion of those children with defective hearing in the public schools. Still, these students show evidence of a widening academic gap from their normal hearing peers by the end of third grade.

Hearing impaired children, in the past have had as a major emphasis in their curriculum, communication skills. It appears from this study that mathematics skills as well need attention. Group II students performed better on the mathematics section than did the county, overall. Writing skills appeared to be totally unaffected by whether a student who failed hearing tests went to the doctor or not.

One explanation for the strikingly similar results between groups on all sections might be the similarity of type and mild severity of the children's hearing losses. If conductive in nature, the possibility exists that the student's hearing losses may have cleared up in time - irregardless of whether they received medical attention.

An implication for follow-up on the current study would be to determine the prevalence of one or two ear involvement of
students receiving medical attention. An evaluation of these student's verbal language skills compared to their peers would be an additional possibility for future research.
Summary

Subjects in this study were students identified for the investigation by speech clinicians in elementary schools in Brevard County, Florida. There were 75 students at eleven schools who qualified for utilization.

Florida Statewide Assessment Test scores were compared for third grade students who failed hearing screening tests in the first grade. Students were divided into two groups for comparison. Group I included 30 students who went to the doctor for medical attention and Group II included 30 students who did not receive medical follow-up. The remaining 15 students had not yet reached the third grade.

Subjects in this study showed an overall retention rate between grade one and two of 20% compared to nine percent of the entire first and second grade population. In Group II, 28% had been retained while only nine percent from Group I had been retained.

The two groups of subjects were compared on Communication skills and Mathematics skills.

The percentage of subjects in Group I who passed Mathematics skills was less in six of the 14 skill areas than the percentage of the total school population. The percentage of subjects passing the mathematical skills was less in Group II than in the
general school population for four of 14 skills.

In reading, a lower percentage of the Group I subjects passed seven of the 10 skills than the total school population. A lower percentage of subjects in Group II passed eight of the 10 skills than the general population. In both groups a higher percentage of subjects passed the five writing skills than the total school population.

On the basis of this study, medical attention as it pertains to maintenance of a physical problem, comfort and general health is to be encouraged. Academic performance did not differ for the group who obtained medical attention and the group who did not. However, a larger percentage of students in the group not obtaining medical follow-up had been retained by third grade.
Appendix A
Memorandum

From: Catherine Cowan
To: Speech Clinicians

Regarding: Students Failing 1978-1979 Hearing Screening

1. Please list those students whose hearing was tested in 1978-1979 school year (1st graders) and were given medical referrals. i.e. failed the second hearing screening.

2. Indicate "yes" if the student went to the doctor, "no" if they did not go to the doctor. Feel free to also list what the problem was, i.e. if they were treated with medication, fitted with a hearing aid, had surgery, fitted with a prosthetic device, etc.

3. When completed, please send the information either to Pam Treadwell at Exceptional Education through the courier or to my home address: Catherine A. Cowan

360 Sherwood Avenue
Satellite Beach, Florida 32937

An envelope is enclosed for your convenience.

A big thanks to any of you who can help me with this information. If you have any questions or problems you can contact me either at Croton Elementary School (259-3818) or at home (773-7997).

Catherine A. Cowan
Hearing Clinician
Appendix B

Complete Description of Florida State Assessment Communication Skills

Reading

A 1 Identify printed equivalents to orally presented words.
A 2 Associate words with words of opposite meaning.
C 4 Associate contractions with their component words.
F 6 Identify specific details in a selection.
G 7 Determine the stated effect of an action.
H 8 Identify story outcomes.
I 9 Distinguish between real and unreal.
J 10 Identify an irrelevant sentence in a selection.
K 12 Follow written directions to complete a task.
M 14 Put words in alphabetical order by first letter.

Writing

B 2 Classify objects under appropriate headings.
B 3 Arrange four pictures in a sequential pattern.
C 4 Dictate a logical sequence of events from pictures.
G 9 Identify correct spelling of common words.
I 13 Capitalize the first word in a sentence.
Appendix C

Complete Description of Florida State Assessment Mathematics Skills

A 1 Count up to 100 objects.
B 2 Read and write numbers less than 100.
E 7 Identify halves, thirds, or fourths.
F 9 Add three 1-digit numbers (sum less than 19).
F10 Add two 2-digit numbers (no carrying).
G12 Subtract basic combinations (subtraction facts).
G13 Subtract 1-digit from 2-digit numbers without borrowing.
G14 Subtract 2-digit numbers without borrowing.
O17 Tell time on the hour and half-hour.
O18 Determine the length of an object.
O20 Identify sets of coins equal in value.
T21 Solve word problems involving addition.
T22 Solve word problems involving subtraction.
V24 Subtract to solve practical money problems under 50¢.
References


Reference Note