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ABSTRACT

Four papers and reports of six demonstrations given at a 5-day institute for 60 teachers of handicapped children on the topic of listening skills in the curriculum are presented. Teachers are said to have been encouraged to make optimum use of technology to improve the educational program. Ursula Hogan discusses the nature of listening as related to reading and classroom performance. Rose-Marie Swallow analyzes listening and auditing in terms of auditory perception components. Dean Tuttle stresses the importance of listening as a means of reading and suggests objectives and activities to develop listening skills. Compressed speech is given as one way to read by listening in the paper by Emerson Foulke. The following institute demonstrations are briefly described, establishment of communication with a nonverbal cerebral palsied boy, the use of videotape with a group of retarded women, recording for the blind, equipment used by the Library of Congress to record books, slides showing the importance of technology to teachers of handicapped children, and a description of the Master Tape Library at the Compressed Speech and Aural Media Center. Appended are articles on the status of speech compressons, the establishment of computer services for the blind in Kentucky, the audio-tutorial method; and a list of sources for appropriate commercial materials. (DB)

Learning Through Listening:

Applying Listening Skills to the Curriculum

Proceedings of a Special Study Institute Sponsored
by the Division of Special Education

California State Department of Education

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Foreword

Listening is one of the most important of the four communication skills: listening, speaking, reading, and writing. Modern research has proved that the skill of listening can definitely be improved through a systematic program of instruction. And although learning through listening is important for all human beings, it is of special significance to handicapped children.

This publication, *Learning Through Listening: Applying Listening Skills to the Curriculum,* is an important result of the Special Study Institute conducted at California State University, San Francisco, in August, 1972.

The purpose of the Special Study Institute was to acquaint teachers of special education with the latest techniques and methods of teaching listening skills. Specifically, this is done by:

1. Exploring how handicapped pupils learn through listening
2. Teaching the concepts of "hearing efficiency" and "selective listening"
3. Examining and assessing present listening programs developed both by teachers and commercial firms
4. Studying recording technology

I firmly believe that this publication will be invaluable to you who are entrusted with the education of our most important resource—our children.

Superintendent of Public Instruction

Preface

The Learning Through Listening Special Study Institute was conducted at California State University, San Francisco, in August, 1972, to acquaint classroom teachers with the latest methods of teaching listening skills. The institute was directed especially toward teachers of exceptional children.

The institute was the first phase of a three-part program sponsored by the California State Department of Education and funded under provisions of Public Law 91-230. The second and third institutes will be designed for administrators and classroom teachers, respectively. It is hoped that the cumulative effect of the program will be the implementation of effective curricular devices for teaching listening skills in California classrooms. To further this goal, this publication can be used as a resource document for planners of remaining phases of the program, for those who attended the first institute, and for those who were unable to attend.

The institute was planned and directed by Georgie L. Able of California State University, San Francisco, and by E. Eugene Black, Robert J. Gowan, and Frederick L. Sinclair of the California State Department of Education. We are grateful to them for their diligent efforts and also to California State University, San Francisco, for hosting the first special study institute.

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Associate Superintendent of Public Instruction; and Chief, Division of Special Education

ALLEN G. COLTHARP
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Introduction

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The Learning Through Listening Special Study Institute was planned and administered through the cooperative effort of the California State Department of Education and California State University, San Francisco. It covered a period of five days and was held on the campus of California State University, San Francisco. The participants represented teachers of exceptional children from the areas of the educationally handicapped, the orthopedically handicapped and other health impaired, the mentally handicapped, and the visually handicapped. The desire was to cut across strict categories by including a larger number of teachers who would have a broad interest in the application of listening skills to the types of children they are serving.

The goals of the Institute, as set forth by the staff, were (1) to teach the concept of "hearing efficiency" and selective listening to teachers; (2) to explore with teachers how their handicapped pupils learn through listening and how to apply listening skills in their general and special curricula; (3) to identify and assess listening programs, both commercial and teacher produced, and to determine how effectively they meet their objectives; (4) to determine the effectiveness of specific listening programs for selected groups of handicapped children by levels and categories; (5) to study curriculum materials and techniques as they relate to individual pupil objectives and to adapt curriculum content to a listening format appropriate for individual children; (6) to study research in recording technology and to demonstrate the use of commonly available recording and playback devices; and (7) to demonstrate ways in which listening programs can enhance and supplement the curriculum.

This institute represents the first phase in a three-part project. As stated, Phase I was to have a selected number of teachers representing various categories of exceptionality. Phase II is planned for a selected number of administrators, and Phase III will be directed toward classroom teachers serving handicapped children. The rationale for the project was presented as follows:

> Oral communication is vitally important to handicapped children. In oral communication, the listener is as vital a factor as is the speaker, with today's research showing that the process of communication can be improved by teaching the skills of listening. Listening has often been equated with hearing or, at best, with attention; however, reliable evidence shows that listening is a skill that must be taught. Good listening skills are not acquired through simple hearing, but through a systematic, sequential teaching process.

Listening – Our Ally in Teaching and Learning

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With the development of radio, television, sound films, and recordings, the modern world shifted from a print-dominated one to an oral-aural one. This reversed the situation that occurred with the invention of printing. Eye training and visual perception became the chief concern of educators when books and print materials were readily available. In the 1930s, interest in listening as a valuable tool of learning was renewed. Experimentation, investigation, and research concerning the listening process began. A change in thinking about the listening act almost immediately became evident—quietness and passivity were replaced by identification of listening as an active process. Prior to 1944, "listening" was listed under "attention" in the *Education Index*, but it now receives a category of its own.[1]

Casual observation does not suffice to identify learners actively participating in listening. Nonverbal responses such as nodding, smiling, and signs of boredom, as well as follow-up activities, provide evidence of the quality of listening.

Listening is a thoughtful process ending in thoughtful reaction. It is not a discrete skill nor a generalized ability, but rather it is a constellation of specific abilities. It is purposeful, accurate, and evaluative.

The typical day of most persons is composed of many give-and-take talking situations. This commonplace activity requires an attentive role of catching ideas expressed and responding to them. An individual's life abounds in social, business, and esthetic experiences that involve listening. Vocationally, both those in service

[1] *Education Index*. Edited by Julia W. Ehrenreich. New York: The H. W. Wilson Co., 1972, p. 532.

positions and in professional pursuits engage in listening and appropriate reaction. Responsible citizenship relies upon effective, critical listening in exercising judgment about candidates and issues. No more fundamental a citizen's duty concerning rights and freedom exists than objective action based on basic principles and truth.

Hearing and Listening Are Not Synonymous

Many times we hear but do not comprehend. Unless the intake of information and ideas produces a reaction in the listener, communication is not complete. Even elementary school children distinguish between hearing and listening.

Listening can be divided into four main phases:

1. Literal meaning–plain sense comprehension.
2. Interpretation–speaker's purpose; main ideas and supporting details; interrelationships among ideas; identification of attitudes, biases, or prejudices; and word choice and figurative language.
3. Analysis and evaluation–consistency with commonly known data; the weighing of fact, opinion, judgment; omission of certain facts; and techniques employed to influence the listener's thinking. Evaluation will include the value of the presentation in terms of adherence to the truth; the competency of the speaker in the field of subject presented; and the honesty and integrity with which arguments and views were given.
4. Cognition or absorption–frequently labeled auding. The listener takes new ideas and evidence to modify previous understanding; seeks new goals; develops new interests; and shows greater open-mindedness.

Auding is a term advocated by Brown, one of the early researchers in listening. He believed that listening and hearing were too frequently equated and that a more meaningful term was needed.[2]

Horrworth interprets auding as hearing + listening + cognizing. He characterizes the listening act as a people process, as well as a language process. His reasoning is worthy of note. Horrworth states that in order to listen the individual needs to have experienced an attentive listener to his own ideas and thoughts.[3] This observation is of utmost importance in the classroom. Teachers need to talk less

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[2]Don Brown, "Teaching Aural English," *English Journal*, XXXIX (March, 1950), 128-36.

[3]Gloria L. Horrworth, "Listening: A Facet of Oral Language," *Elementary English*, XLIII (December, 1966), 856-64.

and listen more; they should provide opportunity for speaking-listening activities among children to a greater extent than is evident in most classrooms.

Listening--An Aid to Growing Up

The infant relies heavily on the aural process. The recognition of family voices; the adjustment to routine, normal sounds; the imitation of the speech sounds of those around him; the association of names of people, animals, and things with the objects; the approximation of words heard; and the adoption of the speech patterns of the family circle are steps necessary to the growth and independence of the child.

Encouraging comments evoke repetition of a behavior, refinement and extension of these behaviors lead to new explorations and achievements. As educators, the practice of favorably commenting on children's efforts should be kept in mind.

The child develops a defense against adult haranguing by simply tuning out. He brings this behavior to school, and teachers need to keep in mind that nagging about work and behavior produces negative results.

In play with peers in the neighborhood, the child extends his vocabulary and store of meanings. He recognizes anger and threat in the voices of others, and he adjusts to the situation either by withdrawal or confrontation. By the time the child enters school, he has a sizable vocabulary to express himself, and he has a comprehension vocabulary that is much larger.

School entrance tends to reduce the child's reliance on listening due to a variety of reasons. First of all, free exercise of choice of whether to listen or not is curtailed. The teacher, being concerned with the group, gives directions and explanations orally. Individual children may respond quite differently. Bright children often reject the triviality of the content and fail to comply with instructions. Children with meager language power or poor auditory perception cannot meet the terms of the assignment. Secondly, new skills are presented for mastery, with heavy emphasis on reading and visual skills. And, finally, the amount of listening becomes too much of a burden, and the child falls back on his preschool defense mechanism of tuning out.

Progress through the grades increases the number of skills to be mastered. Pen and pencil exercises grow in number. Listening situations are unplanned and unstructured. Fragmentation of language into its components (listening, speaking, reading, and writing, including spelling) destroys the unity of language and robs the child

of the opportunity to recognize the relationships and reciprocal reenforcement of one phase with another. Emphasis on reading continues without much attempt to improve the quality of listening.

Reading and Listening

Both reading and listening phases of language are the intake aspects; they show a marked similarity in skills. Before the availability and use of the tape recorder, reading held certain advantages over listening: (1) availability of books and other printed matter; (2) the reader's ability to adjust his speed to suit his purposes; (3) the ease of going back to reread when confusions or misunderstandings were encountered; and (4) the wide selection of appropriate materials for any need. Reading still is rated a better medium for the study and interpretation of complex material. An advantage of listening over reading is frequently overlooked, i.e., material presented orally provides more meaning cues than reading because the tone of voice, points of emphasis, meaningful phrasing, and pauses can never be matched by printed symbols.

Farrell, in "Listen, My Children, and You Shall Read . . . . ," makes clear the value of the teacher reading to students. His conclusions are worth remembering. First of all, reading literature aloud to students is educationally sound; and, for many youngsters, it is necessary. Furthermore, if a teacher wishes to help students become critical listeners and if he intends teaching the literature he reads orally, he must plan his lessons carefully so as to build bridges between the experiences of the youngsters and the experiences presented in the literature, and to provide sequences of questions that set the purposes for listening.[4]

A counterpart to speed reading is listening to compressed speech. Normal speech production is 100 to 125 words per minute. The brain, however, can receive speech faster than a speaker produces it. Research suggests that compressed speech, with the message spoken faster than normally produced, makes concentration easier and comprehension greater.

Classroom Provision for Listening Growth

Educational practice, like society in general, has made speech the focal point of communication, with little consideration given to listening. In any listening-speaking situation, school practice should be concerned with both phases of communication, roles should be

[4]Edmund J. Farrell, "Listen, My Children, and You Shall Read . . . . ," *English Journal*, LV (January, 1966), 68.

defined, and responsibilities should be made clear. The listener should be informed what to expect and to what particular ideas he should pay attention; the plans for utilization of the content should be specific. The speaker should be instructed to make clear his purposes and ideas, to organize his material in a reasonable pattern, and to keep contact with his audience.

Kinds of listening experiences should be varied. Many experiences, especially those for the younger child, should be for sheer enjoyment. Other experiences should include following directions, finding the main idea, selecting important details, noting vocabulary, seeing relationships, and recognizing summary statements.

Learning is a forward-moving process that enables the learner to regroup his responses in an infinite variety of ways. The more sophisticated the pattern of regrouping and the more flexible the responses to new situations, the greater control the individual has over his environment. Growth in listening power should indicate that the listener is making steady progress in his ability to follow oral presentations and to react thoughtfully.

Teachers desirous of improving listening might keep these points in mind:

1. Reduce the amount of talking and telling in the teaching act.
2. Serve as a model of a good listener.
3. Vary the stimuli in presenting material.
4. Use different communication techniques to arouse and maintain interest.
5. Make frequent informal appraisals of listening growth.

Those who work with children of lower socioeconomic status may discover that children in this group tend to have lower auditory perception because of the noise factor in their environment and because of the lack of sustained conversation in the home. Poor auditory perception handicaps the child in the early stages of learning to read when speech sounds and language patterns are important. Irwin decided after investigation that children under two and one-half years improve in vocal production and comprehension of what is said if the parents read selected books to them and talk to them more.[5]

The dyslexic child also has poor auditory perception and has difficulty in blending sounds of letters to produce a word. Since auditory perception enables the child to distinguish differences in sounds and sound sequences, the dyslexic child and others with low

[5]Orvis C. Irwin, "Infant Speech: Effect of Systematic Reading of Stories," *Journal of Speech and Hearing Research*, III (June, 1960), 187-90.

auditory perception require activities that will strengthen auditory perception and that will sharpen discriminatory ability of sounds and groups of sounds.

Continuous systematic instruction in listening is necessary to achieve maximum returns. This instruction need not be an added subject to the program. Rather, the recurring occasions when oral presentation is the natural approach can be utilized to increase listening power. Directions, explanations, assignments, recitations, and reports can be turned into productive listening experiences. The students need to know definitely what is expected of them, and the teacher needs to ensure that the presentation is clear and suitable for the group and to ensure that the material will be utilized in some way in the classroom. Listening to gain information, to follow sequences, to select major points, to reach conclusions, to determine cause-effect relations, to learn new vocabulary, to converse and to discuss, to enjoy plays and music, to appreciate stories read or told, and to identify type of discourse are some of the experiences that can be made available. Standardized tests, informal teacher checkups, observation of listening behavior, and feedback of lesson content are among ways to evaluate growth.

The Development of Listening and Auding

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Listening, attending to sounds, and auding (comprehending spoken language) are basic for human communication and are indispensable components of successful school experiences. Adequate auditory perception and competent linguistic development facilitate learning. Listening plays a primary role in language acquisition, with auding being our chief mode of learning throughout life.

In spite of its educational significance, the development of listening skills and auding abilities has received little systematic research. Equally deficient are programs specifically designed to provide direct instruction for the improvement of auding behaviors in students.

Listening is the chief mode of learning during the elementary school years. Students from preschool through university learn most frequently by listening rather than by any other means.

Adults also gain considerable knowledge through listening. Approximately 75 percent of what we learn as adults, we learn from listening.[1] The importance of this modality as the most viable channel for the development of all communication skills must receive more curricular emphasis if we are to adequately educate for the cognitive growth and intellectual development of the child.

Myklebust defines auditory perception as the ability to structure the auditory world and to select those sounds that are pertinent to adjustment.[2] Auditory perception is basic to language and cognition.

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[1]James I. Brown, "The Measurement of Listening Ability," *School and Society*, LXXI (February 4, 1950), 69-71.

[2]Helmer R. Myklebust, *Auditory Disorders in Children.* New York: Grune and Stratton, Inc., 1954, p. 158.

A child whose hearing acuity is within the normal range may have difficulty analyzing auditory stimuli.

Auditory perception is a process in which significance is attached to the sensations. It structures the stimulations, organizing them into a foreground against a background. Past experiences are also brought to bear on the sensations in order that the sensations can be understood in meaningful context.

What are the processing levels of auditory-linguistic stimuli for the development of listening and auding skills? Four levels have been defined, including analysis of auditory stimuli, sequence of aural data, comprehension of symbolic operations, and correspondence of auditory-visual stimuli. The levels of auditory perception are further subdivided as follows:

1. Analysis of auditory stimuli
   a. Attention to auditory cues
   b. Focus-field selection
   c. Localization of sound sources
   d. Discrimination between sounds
2. Sequence of aural data
   a. Serial ordering
   b. Auditory fusion (blending)
   c. Auditory closure
3. Comprehension of symbolic operations
   a. Auditory reception
   b. Auding skills
4. Correspondence of auditory-visual stimuli
   a. Auditory-visual integration
   b. Cross-modality shift

Analysis of Auditory Stimuli

Attention to auditory stimuli is of prime concern to the teacher. Inattentiveness may be due to various causes, some of which are (1) loss of hearing acuity; (2) distractibility due to competitive auditory and visual stimuli; (3) hyperactive and maladaptive behavior; (4) inability to obtain meaning from the auditory stimuli; and (5) habitual inattention.[3]

Focus-field selection is akin to figure-ground in visual perception. Some children experience difficulty in selecting relevant from unmeaningful auditory stimuli. We are constantly masking out

[3]James C. Chalfant and Margaret A. Scheffelin, *Central Processing Dysfunction in Children: A Review of Research.* NINDS Monograph No. 9. Washington, D.C.: U.S. Department of Health, Education, and Welfare, 1969, p. 11.

continuous environmental noises in order to attend to or focus upon revelant auditory cues.

Sabatino suggests that there is a minimum focus/field difference level (60/54 decibels) in order to attend auditorially.[4] If this is true, there may exist in some children reduced focus levels. The teacher's task would be to increase the difference between focus and field by lowering the environmental field level of acoustic stimuli. For such children, who may have difficulty attending to focus, offering instructional activities or aurally taped materials that require the use of earphones, which mask out extraneous sounds, may increase their attentional behavior. There is little research data clarifying the effects of background noise on listening or auding ability.

Localization of sound sources refers to the ability to associate sounds with their actual sources, for example, the clock ticking or mother speaking. Spatial awareness and directionality are component behaviors of this item. The ear closest to the sound source receives the acoustic vibrations earlier than the ear farther away. Being able to localize sound aids in associating sounds with objects or events.

Discrimination between sounds is the ability to differentiate one sound from another. There are two major sound sources: (1) human, which includes vocal sounds (phonemes), words (lexicons), phrases, etc.; and (2) nonhuman, which are all sounds not produced by vocal encoding.

An auditory discrimination disability is not due to loss of hearing acuity, but rather to an inability to discriminate one sound from another. Of educational concern is the reduced ability of children to differentiate speech sounds or phonemes. The Wepman Test of Auditory Discrimination (WTAD) was designed to determine the child's ability to recognize the fine differences that exist between the phonemes used in standard English speech.[5]

It is more difficult to discriminate between similar sounds (for example, /d/, /t/, /p/) than between sounds that are acoustically more varied. For this reason, training proceeds from familiar environmental sounds to vocal units--from gross to fine sound differences.

Sequence of Aural Data

If the analysis of auditory stimuli is fundamental to the processing of auditory and linguistic stimuli, the sequencing of these variables

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[4]David A. Sabatino, "The Construction and Assessment of an Experimental Test of Auditory Perception," *Exceptional Children*, XXXV (May, 1969), 729-37.

[5]Joseph M. Wepman, *Wepman Test of Auditory Discrimination*. Chicago: Language Research Associates, 1958.

and the retention of their orderings are equally important. The sequence of aural data is the second level for the development of listening and auding skills. Sequencing involves the temporal ordering in which auditory events occur.

Serial ordering is the sequencing of sounds, symbols, or signs. The sense of vision is instantaneous: audition is temporal. Because language occurs in time, the ability to order sounds, words, and ideas is required for understanding meaningful material.

Auditory fusion is blending. Dyslexic and neurologically impaired children often display an inability to blend sounds. Auditory blending of sounds to form words is the synthesis of sound units into wholes, e.g., /p/ /a/ /t/ = "pat" and /m/ /a/ /n/ = "man." Obviously, the phonics approach to reading requires the ability to blend sounds. The Open Court Reading Program trains specifically for this ability.[6]

Auditory closure is the ability to fill in the missing parts. It is being able to "close" an aurally presented word when at least one phoneme is omitted, e.g., /el/e/–/ant/ is "elephant" and /ba/–/oon/ is "balloon." Grammatical closure, on the other hand, is the ability to predict closure, anticipating the missing or coming word through word ordering of sentence patterns. In the sentence, "I see a _____.", no matter what word is supplied, it automatically must be a noun. All other parts of speech have been eliminated. Nonachieving readers often lack this predicting ability and are therefore unable to anticipate the sentence structure or word order.

Cazden has stated that a common measure of development in grammar is the mean length of response.[7] Miller theorizes that the "span of immediate memory" (short term memory) is not determined by the amount of words per sentence, but by the number of "chunks" of information the subject can organize. To the extent that a person can organize information into chunks, can he increase his immediate memory; and to the extent a child has syntactical control of the language, can he automatically "chunk" the information presented into grammatical units and thus retain sentences of greater length.[8]

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[6] *Correlated Language Arts Program.* La Salle, Ill.: Open Court Publishing Co.

[7] Courtney B. Cazden, "Subcultural Differences in Child Language: An Inter-Disciplinary Review," in Vol. II of *Disadvantaged Child.* Edited by Jerome Hellmuth. New York: Brunner/Mazel, Inc., 1970, pp. 217-56.

[8] George A. Miller, "The Magical Number Seven, Plus or Minus Two: Some Limits on Our Capacity for Processing Information," *The Psychological Review,* LXIII (March, 1956), 81-97.

Comprehension of Symbolic Operations

Comprehension of symbolic operations is the third processing level for the development of listening skills. Comprehension is directly linked with symbolic thought processes. It is the means by which the child decodes and understands spoken language or aurally taped materials.

Piaget has designated three levels of symbolization: (1) index, (2) symbol, and (3) sign. The index and the symbol are at the preverbal level and serve to strengthen the symbolic process. *The child who has had a variety of preverbal symbolic experiences will be able to create a mental image when he hears the teacher's words.*[9]

Auditory reception is understanding the structure and meaning of language, i.e., decoding the language of the communicator. The child's repertoire of words (vocabulary) and grammatical patterns (syntax) are regulated at this level of development by the speech forms used by the communicator.

Auding skills, on the other hand, are the relationship between the child's language and thought processes. Auditory reception is communication-orientation: auding is cognitive-orientation. The former combines the child's language and receptive communication, whereas the latter combines the child's language and cognitive thought, although the ability to aud is not entirely dependent on intellectual development.

Research indicates that school children increase their auding abilities through direct and indirect instruction in auding.

The Alameda County Listening Comprehension Skills Program is based on the following key auding skills:[10]

1. Inferring connotative word meanings
2. Identifying mood, humor, and so forth
3. Providing examples by details
4. Reinstating sequences of ideas
5. Identifying main idea
6. Predicting sequences of thought
7. Inferring speaker's purpose
8. Applying standards to judge persuasion
9. Inferring main idea from specific
10. Judging logical validity
11. Identifying sequence ambiguities

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[9] Jean Piaget, *Play, Dreams and Imitation in Childhood.* New York: W. W. Norton and Co., Inc., 1951, p. 98.

[10] *Programs in Oral Communication.* Cassette and tape recordings prepared by Alameda County School Department. San Francisco: Hi-Speed Duplicating Co., 1969.

Since children of equal intelligence vary in their reading abilities, they also vary in their auding skills. A direct instructional program matched to the child's auding level will develop abilities in school children. A total program will present programmed learning activities for the development of listening skills and auding abilities. A sequenced auditory-linguistic program includes learning activities at the preverbal and the verbal levels.

Correspondence of Auditory-Visual Stimuli

Level four for the development of listening skills is correspondence of auditory-visual stimuli. Neurologically, there are certain centers of the brain that are associated with vision and auding. Yet there does exist common pathways for both sensory stimuli. It is on the basis of separate pathways and common pathways that we assume cross-modality shift and auditory-visual integration. Many successful remedial teaching techniques have utilized a multisensory integration approach. Since the multisensory approach is helpful for some learning disability children, but may overload the system of others, an assessment of correspondence does appear relevant for the understanding of central processing of visual-auditory stimuli. Children with learning problems have integrational deficits.

The child needs language not only to understand concepts but also to retrieve and express them. To express himself, he needs to know the forms with which to communicate both feelings and ideas. To understand aural material in the classroom, he needs to receive direct instruction in how to aud, or else he needs to receive remedial training in order to progress to where he understands the language code. The teacher needs to possess the skills of programming and remediation and to be familiar with the techniques and materials available to him.

In our programming model, the child's learning activities have been sequenced in order of developmental difficulty along three continuum variables: (1) stimulus (dimensions); (2) process (levels); and (3) response (judgmental responses). We have already discussed the stimulus and process variables. Stimulus sequencing refers to dimensions, preverbal stimuli, and verbal stimuli: index → symbol → sign. The child first acquires inner language by means of imitation and symbolic play. These precede and contribute to symbolization.

Process sequencing refers to the processing levels of our programming model: analysis → sequence → comprehension → correspondence. The model suggests that in acquiring auditory receptive language, the child first integrates the system of language he uses into a code. This code reflects the highly organized structures of language,

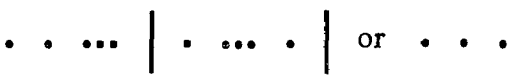
essentially linguistic patterns. The child will then acquire word order sequences and sentence patterns in relation to his ability to "chunk." Since reading is a once-removed symbol system (a system of visual symbols of verbal symbols), the logical conclusion is that a language processing deficit of the primary type--central language processing--precedes acquisition of the visual language system.

When a child has a visual processing deficit with adequate language development, substitutions are in order, i.e., taped materials for dyslexics. It should be noted that at the level the child comprehends language, he should also be expected to comprehend taped materials. Auditory language processing involves the decoding ability of receptive language.

The final sequencing variable is judgmental responses: descrimination → recognition → immediate recall → and reproduction.

Discrimination is defined as the act of perceptually differentiating two stimuli as "same" or "different." This is totally at the perceptual level of response, e.g., do "baby" and "daddy" sound the same or different?

Recognition requires attending to and retaining specific parts of the stimuli in addition to the whole. Recognition, involving matching and identification, is defined as perceptual retention of the initial stimulus in order to identify or match it on representation. The child is required to attend to the parts. A matching task is: which is the same as this tapping pattern?



Immediate recall, on the other hand, requires remembering the original stimulus and reproducing it. This is the first judgmental response to include both decoding and encoding. The child hears "ball" and then says "ball." The child must retain and produce the original stimulus. Immediate recall includes short-term auditory memory and immediate reproduction. Habituation and automatization are developed at this response level.

The last judgment response is reproduction, in which long-term memory is facilitated by verbal traces and verbal mediation. The automatic habit chains of language are developed. The child no longer relies on stimulus cues. The process of learning and using language is being completed. Reproduction is automatic.

This programming model for the development of auditory perception is based on the sequential presentations of learning activities in the classroom along three variables: (1) stimulus, (2) process, and (3) response.

Reading by Listening: Suggested Objectives and Activities

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You have had an opportunity to hear about listening, with all its implications for learning. And, prior to this discussion, you have heard Dr. Foulke discuss the history of technological advances and the needs in this area as applied to handicapped children. You now realize the importance of learning by listening for both normal and handicapped children in your schools. The research is promising, and your interest should prompt further refinement of your teaching strategies.

My primary interest in this presentation is in the importance of listening as a means of reading. My previous research with visually impaired children supported my earlier interest in listening as a valid form of reading. In order to cover the material I wish to present, I am sharing with you an outline of objectives and activities, which I feel teachers can use to improve instruction and to enrich the lives of children in all phases of their reading in the various curriculum areas. To save time, I would like to take the outline item by item. I would like you to raise appropriate questions and make suggestions as they occur to you.

I hope you will be equally interested in the equipment and examples, which will be presented auditorially. Knowing that all teachers are eager to learn where to find materials, both in commercial supply houses and in specialized agencies, I am providing a list of commonly available materials for meeting the objectives we plan to cover in our presentation today.[1]

[1] See Appendix D, Commercial Materials for Reading by Listening.

If there are questions either about the organization or any of the ...ms, please feel free to raise them as we progress. Your discussion ...ould enhance the presentation.

I. Pre-"Reading by Listening" activities and allied skills

A. Auditory discrimination

1. Identifying sounds other than words

The children sit quietly listening for sounds. They identify clock ticking, car going by, steps in the hall, dog barking, and thunder. The teacher also may say, "I hear a sound in the hall. What is it? Can you make that sound?"

2. Reacting to sounds

The children give appropriate reactions to sounds, e.g., to a fire bell, a car horn, and a schedule bell.

3. Localizing sound sources

Children identify sound source and distance of source, and sound direction, volume, and pitch.

The children listen to bird's chirp, classmate's voice, fast or slow steps, and different kinds of airplanes, cars, and bells.

4. Hidden sounds, figure ground

Three children stand in front of the class. The teacher tells the class that all three pupils will be talking at the same time but will be saying different things. The class is to concentrate on what the child who is standing in the middle is saying. They are to pay no attention to the other two. For practice in hearing the middle child's voice, the teacher has him repeat a sentence alone, for example, "Amid city noises, can you hear the distant church bells?"

5. Identifying sounds within words

The teacher says three words to a small group of children. They listen carefully and tell which word of the three does not begin like the others, e.g., "run"-"red"-"Tom" and "time"-"table"-"door."

The teacher pronounces a word and then pronounces the same word or one that is slightly different from it. The child called on must say whether they are the same or different, e.g., "bat-back," "bang-bank," "eat-heat," "necks-next," and "sleep-slip."

B. Descriptions

The teacher describes objects in the room and has the children guess what the objects are. The teacher says, "Can

you guess what I see? I see something with four legs. a back, and a seat. What is it?"

The teacher has the children describe certain tasks, e.g., "How do you wash your hands; how do you put on your shoes?" The teacher insists on verbal responses with no gestures.

C. Follow directions

The teacher encourages children to give directions to one another. They may give directions to the nearest stoplight, the corner mailbox, or their home.

The teacher gives oral directions for folding a piece of paper, beginning with simple directions such as, "Fold in half." The complexity of folding is increased until pupils can follow directions to make an object such as a lantern or a paper bird. Later they use scissors and ruler.

The teacher says to a child, "Clap your hands three times, turn around two times, and stamp your left foot four times."

D. Listen for rhyme, rhythm, and colorful combinations of words

The teacher says two words at a time, e.g., "hard-lard" or "run-jump." The children stand up if they hear that the words rhyme. For mature children, the teacher says sentences such as, "This seed makes good bird feed. John likes meat to eat." The children tell the rhyming words in the sentences.

The teacher performs rhythms that the child is to duplicate, e.g., clapping hands, beating drums, or combining two types of rhythms.

The children make up sentences using alliteration.

E. Associations

1. Alike and different.

The teacher encourages children to broaden their thinking from simple responses to abstract thinking by asking, for example, "How are a horse and a cow alike? How are they different?" The teacher continues asking about a spoon and a fork, a hat and a coat, a house and an apartment, milk and orange juice, a car and a truck, and a candle and a flashlight.

2. Opposites.

The teacher tells the children that they are going to play a game using words that are opposite in meaning. For example, "I want you to do as I say. Stand up—sit down. Reach high—reach low. Clap your hands slowly—clap your hands fast."

3. Analogies.

   Omitting the words in parentheses, the teacher says to the children, "Your hand is on the end of your arm; your foot is on the end of your (leg). People walk; fish (swim). We eat on a table; we sleep on a (bed)."

F. Auditory closure

1. Closure of pattern

   The teacher plays an incomplete pattern, which children are asked to complete, e.g., parts of the Westminster chimes, a baseball cheer, and the melody of a familiar song.

2. Closure of words

   The teacher says slowly, omitting the letters indicated, "I (h)ave (t)en (f)ingers. I (h)ad a (g)ood (dr)eam (l)ast (n)ight."

3. Closure of thought

   The teacher has the children complete sentences. For example, "The coffee is too_____to drink. The_____is shining today."

   The teacher reads a sentence to the group and has them memorize it. The teacher then reads the sentence, omitting one or more words, and has a child complete the sentence.

G. Improving attending skills

   The children focus their attention on the person or group speaking without interrupting or distracting. To increase attention span through practice, the teacher gradually increases the length of the stories told.

H. Listen with involvement

   Children sit with thumbs up and the teacher reads sentences. As soon as the children hear a "how sentence," they put their thumbs down. The first child with thumbs down chooses someone to tell the word or phrase that answers the question "How?" Questions could also revolve around words such as "when," "where," and "who."

   The teacher has children listen with the purpose of note taking.

II. Comprehension

A. Identify stated main idea

   The teacher reads short, simple, unfamiliar stories, and the children make up a title for each story.

The teacher presents a paragraph or a short story and offers three sentences as a main topic. The children select the one that most accurately reveals the basic or main thought of the paragraph.

B. Identify details

Children are asked to have their right hands on their desks. The teacher states that she is going to tell the group about an experience she has had. While she stays on the subject, the palm of each child's right hand is to be up. The teacher tells about an adventure, a trip, or a biographical sketch, including some unrelated facts. When she does this, those who detect turn palms down.

The teacher reads a sketch or short story, asking the children to determine which items are necessary to the story, and which are details that make it more interesting.

C. Sequencing ideas

The children listen to a sequence of sounds that have been recorded on tape or a record, and try to determine what series of events the sounds represent. Later the teacher jumbles the order of sounds and has the children put the sounds in correct order.

The children act out a story train on five chairs, one behind the other, at the front of the room. The pupil in the first chair is the engineer. He starts a story by saying, for example, "On my way home, I saw a rabbit." Those in chairs two, three, and four each make a complete sentence about the thing the engineer sees. The child in the last chair repeats the whole story just as the others told it.

Using a tape recorder, the teacher tells a simple story to one child, who retells the same story to a second child. The recording continues for no more than five pupils and is then replayed. The original story's playback should reveal to the pupils their omissions and substitutions.

D. Inferring main idea from specifics

The teacher gives each child a picture or an object and asks him to make up a story about it.

The teacher reads a short story to the group and has the pupils retell the plot in one sentence. The teacher has the children connect these words in a story: "frog-hat-book" and "man-car-lake."

E. Identify mood (fact, fancy, humorous, serious, informative)

Pupils review books read, considering whether the material is realistic or fanciful.

Pupils try to recognize the emotion of the speaker through his pitch, stress, or mannerism of speech.

F. Judge persuasion

The teacher and pupils distinguish fact from opinion in a child's class presentation.

From a collection of advertisements, the teacher makes some judgments about the persuasion process.

G. Predict sequence of thought and events

The teacher tells or reads a story and has the children speculate on the possible outcome if a character's actions were reversed. For example, ask, "What if Goldilocks had not run away."

The teacher tells or reads a short story but does not finish. The children then supply the ending.

H. Inferring connotative word meaning

By using the context clues, the teacher has the children determine the meaning of new words that are heard.

I. Identify sequence ambiguity

The teacher asks the children if they hear anything wrong in the following paragraph:

> When Mr. and Mrs. Jones started to bed, Mr. Jones set his wind alarm clock for six o'clock. During the night, the electricity went off because of a storm. Mr. Jones was late for work the next morning because his clock had stopped as a result of the storm.

The teacher devises examples of nonsense, such as, "John has green hair. The cat barks. Fish walk." Then the children are encouraged to reply in full sentences.

J. Inferring purpose of presentation

After reading a poem, the teacher asks the following questions. "What is the poem about? Can you describe____? What is the author's purpose?"

K. Judge logical validity

The children listen to a paragraph and to multiple-choice questions about causes. The children are given a paragraph to read by listening, and specific questions are asked to show cause and effect. For example,

> When Nicky woke up, he found himself alone. He was in the dark corner of Mr. Ben's barn. Nicky tried the door, but it would not open. He was trapped. How did Nicky feel? Why?

L. Detect misinformation and faulty concepts

Exploiting the Opportunity to Read by Listening

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I would like to make some comments about seeking opportunities to take better advantage of listening ability in educational settings. There are many promising opportunities that we will want to look into very closely. One of these opportunities is with the use of compressed speech, and since I have been identified with compressed speech, I do want to make some comments. However, I also want to talk about listening ability in a more general sense.

In my previous discussion, there was consideration of recent developments in compressed speech technology. Equipment will soon be available that will enable a person to manage word rates for himself. This equipment will provide an important opportunity with respect to acquiring information through listening. Individuals reading from the printed page vary their rates continuously. They respond effortlessly and without awareness, precisely and rapidly varying their rates to the conditions that are applied to reading. When they read material in which there is little uncertainty about what they are going to encounter, they read at a rapid rate. When they encounter material that is more conceptually difficult in terms of unfamiliarity with vocabulary, they read at a slower rate. They do other things as well, but the changing reading rate is one of the behaviors that accounts for the success of visual reading.

When a person reads by listening to the aural recording of another person, he reads at a rate that is determined by factors having not very much to do with his own needs as a reader. The listener's rate is determined by the speaker's articulatory requirements, reading skills, and style. Thus, the listener must listen at a rate over which he has no control. The listener must conform to whatever the reader's organized display provides for him.

Compressed speech gives the listener the opportunity to listen at rates faster than the reading rate of the person who recorded the material. In addition, the ability to vary the word rate gives him freedom in processing the acoustical display that contains the information he wants to gather. We may find that we have to show people how to take advantage of this opportunity. We now need research that will show the best way to teach listeners how to utilize this capability. We now have technology that will be convenient and cheap enough to permit people to choose the word rate and to vary that word rate in accordance with their continuously changing listening requirements.

You may want to examine copies of my article coauthored with Dr. Sticht that appeared in the *Psychological Bulletin.*[1] Research thus far has been conducted on university students. Research should be based on a body of experience drawn from other listeners who do so on a continuous basis and for serious purposes. There are other opportunities that I would like to bring to your attention. Some of them might not be easily included under the title of "reading by listening," but they do have in common the element of gaining information by listening. One of these is the ARTS system.

ARTS is an acronym—Audio Response Time Sharing. This is a computer-based system that will distribute information on a time-shared basis over telephone lines. It was developed by Kenneth Ingham, professor at MIT in the electronics laboratory. This system is appropriate for blind people working in a variety of occupations and professions. This system provides the kinds of services that are difficult for them to obtain, the kind that they must ask other people to do for them. The system is now available for deployment and evaluation.[2]

Another opportunity that should be exploited in the field of education of the visually handicapped has to do with Audio Tutorial Instruction. This approach represents the application of principles that have been developed by educators and psychologists for a good many years. Audio Tutorial Instruction was developed at Purdue University. This system was developed out of a concern for students, who learn and process information at different rates, but for whom recorded courses have been presented at a fixed rate.

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[1]Emerson Foulke and Thomas G. Sticht, "Review of Research on the Intelligibility and Comprehension of Accelerated Speech," *Psychological Bulletin,* LXXII (1969), 50-62.

[2]See Appendix B, A Proposal to the State of Kentucky to Establish Computer Services for the Blind.

Audio Tutorial Instruction lectures were first prepared on tapes that students could use independently. Then students engaged in directed activities for specific learning objectives. The directions related to other phases of the instructional program, to films, to analyses of data, and eventually to laboratory activities. Through this system, students may progress through the various phases of course content at their own rates.

Audio Tutorial Instruction frees the instructor so that he can give individual help to those students who need it most. It is a teacher-generated program modified continuously by the teacher in accordance with curriculum emphasis and changing student needs. This system, though developed for sighted readers, has very significant applications for handicapped students. The system places the responsibility for the program on the teacher; the progress of the students reflects the effectiveness of the program. This type of program has proved so effective that I prepared a proposal for a similar program for a psychology course at my university.[3]

All of these opportunities, these various systems, have tremendous application for handicapped students simply because they rely on listening—the mode of reading for many handicapped students and especially for blind and visually impaired students.

[3]See Appendix C, The Audio-Tutorial Method.

Demonstrations

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The following lecturers were invited to make presentations that would in some way draw on the previous informational sessions. In addition, they were asked to use techniques that would assist teachers in applying the information of the previous sessions to their teaching. Hence, the lecturers used various types of audio and visual aids that helped the Institute participants to study the importance of teaching listening skills to children in all phases of the curriculum. Of equal importance, the demonstrations helped the teachers to study their relationship with children and their understanding of the important issues that need further research. Those who presented demonstrations were Christine Kusaba, Marjorie Greeley, Helen Lagan, Robert Bray, Robert Bowers, and Robert Gowan.

The demonstrations were presented during the last half of the Institute at a time when participants were acquainted with each other and when they had had the time to read some of the handout materials previously distributed. Since those at the Institute came from various areas of exceptionality and had varying amounts of exposure to fields other than those in which they served, there was great opportunity for combining the information and experience to the advantage of all. For example, during the session when nonverbal communication was discussed by Mrs. Kusaba and the handicapped child who cooperated, teachers of the educationally handicapped and the orthopedically handicapped shared their experiences with other teachers. In the discussion of technology conducted by Dr. Bowers, who used slides to show various types of equipment, the teachers of the visually handicapped also shared their specialized experience. Furthermore, during the presentation of Mr. Bray from the Library of Congress, the explanation of the services now available under new regulations to a large number of handicapped children added much to the interest and questions of teachers new to this program.

It is natural to expect that certain of these sessions were much more appealing to teachers, since they are accustomed to relating to

children. For example, in the session conducted by Mrs. Greeley, a real appreciation for the ideas expressed by mentally handicapped children in their TV-taped discussions came through, as well as an appreciation for the empathy of the person communicating with the young ladies. Also, the scope of volunteer service was interestingly delineated and its use was urged by Mrs. Lagan. As a result of her presentation, people who had not used this service were eagerly examining the procedures for getting the service.

While the following brief reviews do not do justice to the presentations, they will serve to help the participants recall the content of the sessions. It is hoped they will also help those who were not at the Institute to search for similar services and techniques in their own communities from local, state, and national sources.

Types of Listening and Communication for the Nonverbal Child
Presented by Mrs. Christine Kusaba

In Mrs. Christine Kusaba's presentation, the teamwork between the teacher and the nonverbal child was extremely effective and most persuasive. The group participation was excellent. Again there was evidence that children are the best teachers of all of us, provided their teachers, the adults, are really searching for communication. The use of slides, charts, and helpful teacher-made materials added to the presentation and stimulated teachers to find answers to some of the problems in their own classrooms.

The demonstrations included the following: (1) observation of nonverbal communication with a nonverbal cerebral palsied boy, Chris, establishing a means of communication with him; (2) a demonstration of her means of establishing acquaintance with Chris and of finding out some of his interests, establishing the means of communication that would secure a response from the boy; and (3) examples of types of listening skills important in academic and other educational settings, such as conversation, information, personal needs, and so on.

The following points were clearly stated, demonstrated, and outlined by Mrs. Kusaba:

1. With the nonverbal child, the educator must provide the child with a means of reply, or no communication will take place.
2. The eye of the beholder (listener) interprets facial movements, voice tone, and so on, in listening to a speaker. This cannot be done with the nonverbal child.
3. The educator should give the child more possibilities for an answer than just a simple "yes" or "no." Things are not always that clear.

4. Communication boards with pictures, letters, words, and devices for comments should be used, including the following:
   a. Notebook
   b. Letter board
   c. Head and hand pictures
   d. Magnetic boards
5. Students and teachers need listening with understanding.
6. We need listening with genuine emotional and mental participation.
7. As a classroom director, the teacher should set up a good listening environment in the classroom with these considerations in mind:
   a. Is the material interesting?
   b. Do you give clear directions?
   c. Do you find your point and stick to it?
   d. Do you deal tactfully and promptly with interruptions?
   e. Do you explain the type of listening expected?
   f. Do you insist on results (tests and so forth)?
   g. Are his physical needs met before you begin?
8. The educator should use methods of gaining attention other than yelling at the students.
9. To teach attentive listening, the educator should do the following:
   a. Read aloud poetry, fiction, and so on, at all ages.
   b. Give a reason for listening.
   c. Vary classroom activities.

The Children Teach Us Through the Media
Presented by Mrs. Marjorie Greeley

The presentation by Mrs. Marjorie Greeley further emphasized the importance of studying both the teacher and the handicapped person in all situations. She did much to encourage teachers to become more interested in all types of equipment that can be found in instruction materials centers, audiovisual departments, and other (often local and state) sources. She felt that teachers who are equipment-shy miss many opportunities for creativity in curriculum planning and in evaluation of both the children and themselves. She challenged teachers to defend equipment costs, which seem much less when good interpretation of their value is documented for the administrator.

Her own TV tapes of young "retarded" ladies in discussion groups brought out the charm and broad interests, as well as the psychological attitudes, shared by the ladies with respect to their

own attitudes toward their problems. She helped the group to listen for much more than the words spoken by the ladies.

There was an excellent discussion period in which teachers who had little or no experience with retarded children raised many questions concerning programs, special schools, and agencies. The implication of both public and private schools was discussed. There was also consideration of the difficulties in observing and working with severely impaired children who have various handicaps, in which the equipment that was demonstrated can become even more important in striving to communicate.

Such comments as the following indicate the type of statements that must have found their way into the notebooks of the participants:

1. Teachers should learn to use existing technology.
2. Teachers talk too much, and this is an ineffective way to create a learning situation.
3. One of the most effective tools is the tape recorder, combined with the use of earphones.
4. Young children are not frightened by machinery. It is a part of their lives.
5. What makes a special education teacher special is that he/she must go beyond the four walls of the school—to the home, to vocational agencies, and to the community.
6. The videotape is a fantastic tool to present to the student examples of what he is doing—and can be used for continued study of one child.
7. Teachers must learn to listen to what their students are telling them.
8. The teacher must have the courage to study herself and grow in objectivity about the merits of her teaching method. She will continue to ask herself the question, "How can I improve approach?" or "Did I show sufficient support?" The desire to build a relationship is always present. If it is on the TV tape, it is there. Can we recognize it and continue to build?

Recording for the Blind

Presented by Mrs. Helen Lagan

Mrs. Helen Lagan discussed the program of the Recording for the Blind in Palo Alto, California, and explained the procedures that are necessary to determine that visually handicapped persons profit from the organization's services. The many rewards of being a volunteer and of cooperating with one as a teacher were lucidly demonstrated in Mrs. Lagan's presentation.

An exhibit of her organization's materials was displayed, and many Institute participants spoke with her about it and examined brochures and forms for requesting the organization's services.

Mrs. Lagan discussed the cooperation between private and public agencies and documented this cooperation with examples of work and plans with the Library of Congress, the public schools, and certain foundations.

In summation, it can be said that Mrs. Lagan's presentation about the Recording for the Blind provided an excellent example of services available from a private agency.

Have You Heard Any Good Books Lately?
Presented by Robert S. Bray

The presentation of Robert Bray from the Library of Congress was unusually helpful to the Institute participants, as they came from many areas of exceptionality. Those who had experienced a long association with Mr. Bray because of their work in the area of the visually handicapped enjoyed the opportunity of asking "What's new?" and those who were newcomers in teaching educationally handicapped and orthopedically handicapped had a chance to get some valuable procedural information.

There were many materials distributed before Mr. Bray's presentation, and these were carefully discussed in relation to the importance of making requests and revealing professional needs. Much time was spent in discussion about the equipment now available and that which is under way, as well as in discussion about new publications that are in preparation. Demonstration of equipment was especially valuable.

Perhaps the most exciting part of the presentation was when some excellent tapes were presented in line with the topic, "Have You Heard Any Good Books Lately?" The difference between reading the printed page visually and reading a book by listening when it has been well recorded was convincingly drawn. As a sighted person, Mr. Bray almost dared the sighted people in the audience to really improve their listening skills if they wish to share these with children.

Mr. Bray, representing a public agency, made clear not only the function of a public agency, but also the necessity of cooperation with all appropriate private agencies.

Some of the more important ideas presented by Mr. Bray and in the recorded materials included the following:

1. Listening is a method of reading.
2. Large, progressive libraries are moving to books on cassettes, treated just as regular books.

3. Make technology work for you.
4. Decide what parts of the history of education and technology you need, and use them.
5. Consumer participation—with both teacher and student as the consumer.
6. Listening and hearing are not the same.
7. Become involved in the development of technology.
8. Be aware of listener's comfort if he is to enjoy reading.
9. The listening form of reading allows use of creative writing just for listening.

The Teacher and Technology: Learning Through Listening

Presented by Robert A. Bowers

Robert A. Bowers has been associated with listening technology for the past eight or ten years, as he developed institutes at Teachers College, Columbia University, in cooperation with the Massachusetts Institute of Technology. His interests have included not only equipment and procedures needed to work in the area of learning by listening skills, but also those related to braille reading and the equipment needs in the area of orientation and mobility skills.

During the first institutes, participants were largely selected from graduate students in the various programs at different universities, with the addition of educators, engineers, and administrators. Equipment from general supply houses and equipment specifically designed for the visually handicapped were observed and evaluated. The scope of the program justified the work on the campuses of Teachers College and MIT. The final institute utilized the knowledge gained in the first two.

At the third institute, representatives from teacher preparation institutions concerned with preparing teachers of the visually handicapped were invited, along with representatives from specialized agencies and schools. The field trips found to be most helpful during the previous institutes were included, as well as the slides and explanations of various devices. The state of technology and engineering, with possible contributions and difficulties, was thoroughly explored. There was an urgent desire to have educators become involved and work closely with those who develop equipment. Repeatedly expressed was the idea that equipment is badly needed, but also considered was the human element in using the equipment as being vital to all future research and demonstration.

Dr. Bowers presented slides from the institutes in the East and related the experiences of the institutes to the importance of the teacher's role in technology. Representing faithfully the point of

view of the teacher and the needs of handicapped children, he was able to share the best of the achievements both of the developers of equipment and of the teachers of handicapped children.

The presentation of Dr. Bowers' can be outlined as follows:

1. Technology is here now—the age of the mass media, with more education going on outside the classroom than inside; hence, action is necessary.
2. The exceptional child is unique, and technology can be made to meet his needs.
3. Much of the current technology is available right now—electronic canes, reading devices, tape recorders, searching devices that give back auditory symbols, sensory aids devised by MIT, and laser canes. By supporting these efforts, we bring down the costs and help handicapped persons. We also enhance our teaching as we seriously evaluate equipment both positively and negatively when necessary.
4. Find out about existing technology.
   a. Hold institutes for teachers and administrators.
   b. Videotape materials.
   c. Examine periodicals.
5. Learn to write specifications for creating materials. State the purpose of equipment specified and its possible relation to education if it is relevant.
6. Early intervention with very young children with new devices is important.
7. See that technological devices become integral instructional methods, not just optional audiovisual equipment.
8. Learn from the past, and share the information with all concerned.
9. Proper field testing of devices is absolutely necessary. It is your responsibility to cooperate with researchers when there is an opportunity to field test equipment with handicapped persons.
10. Speak up for long-range funding. There are far too many short-term projects in which far too little information is gained. The effects of certain equipment on the children over a long period of time and the durability and service requirements of the equipment can become very important both educationally and economically.
11. Be open to change and educate children for change. (Perhaps that means keep the channels open for the child and do not stop his adaptability to change.)

12. Technology is getting cheaper and cheaper.
13. Do not be caught unprepared to try out new devices.

The Master Tape Library
Compressed Speech and Aural Media Center
Presented by Robert J. Gowan

The Master Tape Library was discussed by Robert Gowan at the request of the participants. Since many of those in attendance had not had previous experience with the Library, it was most helpful to have a brief discussion. Originally, only visually impaired persons requested and received the Library's services. As will be seen in the following comments, many more handicapped children may profit from the program than presently do so.

Those at the Institute felt that California has been resourceful in offering this service as a part of a larger service program of educational materials in the different media. Perhaps in no other part of the country have teachers been able to request and secure such comprehensive service.

Mr. Gowan's description of the program follows:

Students in public and private schools who are unable to read regular printed materials can be provided with recorded materials geared to their individual learning needs and levels.

The materials now located in the Master Tape Library (MTL) have been developed and selected by a committee of specialists serving in county and school district programs for exceptional children. The MTL can duplicate available tapes of textbooks, reference books, and other study materials for the visually handicapped, the orthopedically handicapped and other health impaired, the educationally handicapped, the educable mentally retarded, and the homebound and hospitalized students.

At present, the tape library consists of approximately 2,000 titles, with additional titles being added daily. District personnel may send ink-print copies of materials they wish recorded when they find that these titles are not in the existing library. All MTL titles are capable of being compressed at rates between 20 and 50 percent.

The library master tapes are standardized. The materials are recorded on 1200-foot, four-track tapes at 3¾ inches per second. Schools obtaining materials from the MTL are asked to accept duplications recorded to MTL specifications. To keep the speed-length ratios compatible, duplicate tapes on which the speed is reduced from 3¾ ips to 1⅞ ips must be recorded on 600-foot tape. The playback speed for cassettes is consistent at 1⅞ ips on C-120 cassettes. However, with the advent of new equipment, this speed and length may be reduced by half.

Persons interested in the Master Tape Library and the Compressed Speech and Aural Media Center may obtain catalogs and information regarding the program by writing to Master Tape Library, 721 Capitol Mall, Sacramento, California 95814.

Summary

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Robert J. Gowan
Master Tape Library
California State Department of Education

Sixty participants, a group of consultants, and the staff of the Institute experienced a productive five-day session dealing with a most exciting topic, "Learning Through Listening." During the Institute, the application of research affecting both normal and handicapped children was explored. The contributions of persons from various areas of exceptionality made it possible for each participant to share both experiences and questions.

The informational presentations at the beginning of the Institute provided the necessary background for the "sharing" sessions during the second half of the Institute. There were ample opportunities for applying the previous research findings to the activities of the teacher of handicapped children. Demonstrations of equipment and explanations of available services offered great encouragement to teachers of all types of handicapped children. The participants expressed keen interest in the needs of the visually handicapped, the retarded, the orthopedically handicapped, and children with severe problems in communication.

Because of the expert discussions about available technology, there was a genuine desire to examine equipment during the exploration sessions, and also during the demonstrations that were offered in the general sessions. Teachers were urged to be more creative in their use of all types of equipment and to gain more knowledge of technology needed and under way. Repeatedly they were asked not to be afraid of technology. In all experimentation with equipment, the teachers were asked to recognize that whichever approach or use of equipment was selected, it is only important to children in terms of the difference it makes in the educational program.

The formal presentations in the first part of the Institute of necessity had to be brief and selective. As a result, all of the papers could not be presented in their entirety; and, indeed, some of them had to be cut much more than might be desired. The staff had finally to accept the fact that the participants received greater benefit than would be possible for those who were not in attendance. The purpose of this publication is to encourage other teachers and administrators to develop further institutes, to share knowledge, and to engender greater understanding of the importance of developing listening skills in all children. It is also hoped that there will be a fuller appreciation for using technology to enhance learning by listening skills.

A new respect for listening was developed at the Institute. All the speakers who had experimented with various forms of curriculum and research testified that the potential is vast. Greater development of equipment and more careful attention to teaching strategies can make a great difference in the skills of both teachers and handicapped children. Each participant was urged to share with his administrators the impact of the Institute and to encourage further similar experiences to help more teachers gain greater confidence, to secure a greater variety of services, and to engage in more research affecting the listening of all concerned.

It is hoped that through the efforts of those responsible for the financing and planning of the Special Study Institute, there will be sufficient expression of the Institute's value to warrant future projects. The original goal was to conduct two additional institutes to include teachers and administrators. Thus, a vital, strong team would result that could affect the educational program of many more children. In the first Special Study Institute, a beginning has been realized; can we expect even greater achievement in the future?

In summation, let us remember that learning through listening is important to all human beings, but to some handicapped children, the skill can assume even greater significance.

APPENDIX A

Compressors—Actual and Imminent[1]

Emerson Foulke
Perceptual Alternatives Laboratory
University of Louisville

For many years, the commercial availability of speech compressors was limited. Around 1960, the Kay Electric Company offered the Vari-box, a compressor based upon the Fairbanks principle, but its performance was unsatisfactory, and the few that were sold are collecting dust on laboratory shelves. Starting in the early sixties, the Gotham Audio Corporation in New York began to import the Tempo-Regulator, and later its successor, the Information Rate Changer. These machines also employed the Fairbanks principle; that is, a rotating cylinder which carried four playback heads was used to obtain samples of speech from a recorded tape. The Information Rate Changer was available in this country until 1970.

In 1969, Discerned Sound introduced the Whirling Dervish. This is a compressor of the Fairbanks type that uses a rotating cylinder with four playback heads to obtain samples from a continuous tape loop upon which the signal to be compressed or expanded is temporarily stored. In the past few years, there has been an increasing interest in the development of new speech compressors, particularly electronic speech compressors, and many of these developmental efforts are now coming to fruition. From correspondence and from direct conversations, I gather that there is considerable confusion regarding the speech compressors that are currently available or in advanced stages of development. The information to follow is presented in the hope that it will alleviate this confusion somewhat. The first four paragraphs present information about speech compressors that are commercially available now. The remaining paragraphs present information about speech compressors which exist as successful prototypes, but which have not yet been brought into production for commercial distribution. The list may not be complete, but it

[1] *CRCR Newsletter* (Louisville, Ky., May 15, 1972), pp. 1-4. Reprinted by permission of the author.

includes all of the speech compressors known to the Center for Rate Controlled Recordings.

The Whirling Dervish, manufactured by Discerned Sound, 4459 Kraft Avenue, North Hollywood, California 91602 [current address is P.O. Box 217, Palm Desert, California 92260], is an electro-mechanical compressor of the Fairbanks type. It is available as a separate unit, or as a component in a system which also includes a Teac tape recorder that has been modified to provide continuously variable tape speed. The control of this recorder has been integrated with the control of the compressor, and it is used to play the tape that is to be compressed. At present, the selling price of the Whirling Dervish alone is $3,000, and the selling price of the system including the Whirling Dervish and the tape recorder is $3,595. A more detailed description of this compressor is presented in the Volume 2, Number 10, and the Volume 5, Number 4 issues of the *CRCR Newsletter.* Now under development at Discerned Sound is a compressor of the same general type as the Whirling Dervish. It will be less flexible than the Whirling Dervish but it will sell at a significantly lower price. Discerned Sound expects to report its availability and price before long.

The VOCOM I is manufactured by PKM, 1976 Ryan Avenue West, St. Paul, Minnesota 55113. This compressor obtains the samples that are represented in the compressed reproduction by starting and stopping a tape as the signal is being recorded on it. The decisions to stop the tape are based upon information obtained from the signal that is being copied. In one mode of operation, compression is achieved by stopping the tape recorder during the unfilled intervals that are distributed throughout fluent speech production. To obtain additional compression, the copying tape recorder may be set to sample vowel sounds by stopping and starting repeatedly while they are occurring. The compressed signal is recorded on a cassette, and the cassette transport is an integral part of the equipment. The VOCOM I accomplishes speech expansion by lengthening the unfilled intervals in fluent speech production. The selling price of the VOCOM I is $995. An article giving a more detailed description of the VOCOM I will appear in the next issue of the newsletter.

Varispeech-I is an electronic speech compressor developed by Professor Francis Lee, a member of the faculty of the Department of Electrical Engineering at M. I. T., and manufactured by Lexicon, Inc., 60 Turner Street, Waltham, Massachusetts 02154. This compressor includes a cassette transport on which the signal to be compressed is reproduced, and a small, special-purpose computer which obtains from the input signal the samples that are reproduced

consecutively in the compressed output. The device is also capable of speech expansion. The selling price of the Varispeech-I compressor is $1,500. A more detailed description of the Varispeech-I appeared in Volume 6, Number 4 of the newsletter.

The Cambridge Research and Development Group, 21 Bridge Square, Westport, Connecticut 06880, has announced the success of their effort to incorporate the functions required for the electronic compression of speech in two integrated circuit chips. These chips are small enough to be included in even the smallest cassette recorders. Cambridge estimates that volume production of this pair of chips should bring their costs down to approximately $10, and that inclusion of the chips in a cassette recorder might raise its cost by as little as $40. Cambridge Research and Development Group is not a manufacturing concern, but it is currently engaged in the negotiation of agreements with manufacturers of tape recorders who will be licensed to incorporate the Cambridge circuitry in the equipment they manufacture. One licensing agreement has already been announced. Crown International, 1718 West Mishawaka Road, Elkhart, Indiana 46514, is now accepting orders for a discrete component version of the Cambridge compressor that will be built into their Crown 800 tape recorder, a professional recorder of the type used in the broadcast industry. The Cambridge compressor was described earlier in the Volume 6, Number 2 issue of this newsletter.

The speech compressor under development at Compressed Time, Inc., 261 West 11th Street, New York, New York 10014, is an electromechanical compressor of the Fairbanks type. The prototype I observed incorporates a cassette transport, modified for continuously variable speed, on which the signal to be compressed is reproduced. The samples of the input signal that appear in the compressed reproduction are obtained by a sampling wheel with four playback heads, from a storage loop on which the input signal is temporarily recorded. Like other compressors of this type, the one being developed by Compressed Time, Inc. is also capable of speech expansion. This compressor is not yet in production, but its developers are negotiating with manufacturers at present. Their objective is a compressor that is cheaper, smaller, and easier to operate than other compressors of the electromechanical type.

The AmBiChron, developed by Mr. Richard Koch, 67 Smith Street, Lynbrook, New York 11563, is a prototype electronic compressor. It is in essence a special-purpose computer that obtains from the input signal the samples which are reproduced consecutively in the compressed output. It is also capable of speech expansion. In its present form, it does not incorporate a tape

transport for playing the tape to be compressed. However, if a tape recorder with an AC motor is used for this purpose, this motor may be operated from a variable frequency power supply in the compressor, and the necessary adjustment in tape speed is then accomplished with the same control knob that is used to adjust the electronic circuitry for a desired compression. The AmBiChron is not commercially available as yet, but Mr. Koch is now looking for a manufacturer. The Volume 5, Number 11 issue of the *CRCR Newsletter* contains a more detailed description of the AmBiChron.

A general purpose computer can be used for the time compression or expansion of speech, and there are several locations in the country at which the necessary software and peripheral hardware have been assembled. However, this is an expensive way to compress or expand speech, and it is most clearly justified when the additional flexibility provided by a computer for the treatment of speech signals is needed to obtain information for research and development purposes.

APPENDIX B

A Proposal to the State of Kentucky to Establish Computer Services for the Blind

Prepared by Emerson Foulke, Jacob Carnes, Jr., Edward Cox, T. V. Cranmer, L. P. Hauser, L. T. Mitchell, and David Murrell

The ARTS System

The ARTS System (Audio Response Time-Sharing), developed by Dr. Kenneth Ingham at the Massachusetts Institute of Technology, consists of a time-sharing computer, programmed to perform a wide variety of services for blind users, and an audio-response unit that transduces the computer output to spoken language. The audio-response unit is connected through sixteen telephone lines to the telephone system. The users' terminal, which connects to ordinary telephone lines, includes two inputs, a standard typewriter keyboard and a keyboard resembling the keyboard on a ten-key calculator, and an output consisting of a loudspeaker over which the listeners hear the computer's response as spoken language. The user gains access to the computer by dialing the computer's telephone number. When he has established a connection to the computer, he types a code on his keyboard that identifies him to the computer, and he is ready to request and receive the services the computer is programmed to provide. Since the ARTS System's time-sharing computer is connected to sixteen telephone lines, it can serve sixteen operators simultaneously, and it is estimated that it can provide services for 300 operators on a daily basis.

At its present stage of development, the ARTS System can provide the assistance needed by blind students and blind practitioners in a wide variety of professions and occupations in order to compete on equal terms with their sighted peers. Here are some examples of services now available.

It can serve as a dictionary. The operator types the word he wants defined on his standard typewriter keyboard. If he has spelled it correctly, he hears, over his loudspeaker, the full dictionary text relating to the word. If he has spelled the word incorrectly, he first hears it correctly spelled, followed by the full dictionary text.

It can provide the blind businessman with a full bookkeeping and accounting service. He types his bookkeeping entries on the correct keyboard and they are recorded and filed in appropriate categories by the computer. He can request the computer to perform accounting operations to develop the data he needs to make business decisions. All the information he has filed in the computer is, of course, available to him instantly on demand. The computer will perform for the operator the full range of functions available on the modern calculator. He can program, from his keyboard, the sequence of operations required in complex analyses.

The ARTS System can serve as a personal secretary. As the blind operator types a letter or other composition, each typed character may be pronounced, if he wishes. If he is interrupted momentarily, he may ask to hear the last word or sentence he has typed. When he has typed the entire composition, he may hear it in its entirety in order to proofread and correct it. Once corrected, an execute command will cause it to be typed, in proper format. The typed copy is available to the operator, and the composition may also be filed in the computer for later recall.

The ARTS System can receive information from other computers, operate on this information, store it, retrieve it and transduce it to spoken language, thus enabling the blind operator to work as a computer programmer. Many blind persons are now employed as computer programmers, but arranging for sensible computer output is a continuing problem for them. The ARTS System solves this problem.

The ARTS System can provide programmed instruction in braille for the newly blinded adult. In this application, the student receives his instruction orally. His efforts to produce braille characters on a braille printer, which can easily be connected at his terminal, are evaluated by the computer. This printer can also be actuated by the computer in order to produce instructional materials for his examination.

In a further extension of its instructional potential, the ARTS System can provide to its users a wide range of computer assisted instruction. Possibilities include academic subjects, such as mathematics and foreign languages, pre-vocational subjects, such as basic arithmetic operations and English grammar, and vocational subjects, such as electronics and computer programming.

The ARTS System will make possible a greatly increased supply of braille reading matter for use by blind students. Any person who is an accurate typist can type on the standard typewriter keyboard at an ARTS terminal. The input thus generated is processed by the

computer, which then actuates a braille printer, producing properly contracted Grade 2 braille. Thus, it is no longer necessary for the person who wishes to transcribe printed matter into braille to prepare himself for this task by mastering an esoteric skill. Transcription can be accomplished by anyone who knows how to type.

The computer can store large quantities of general information, likely to be of interest to its clients, and produce it on demand. It could, for instance, provide a reading service which might include daily news summaries, a calendar of current events, best selling books, weather information, etc.

The examples just given constitute only a few of the services the ARTS System can now provide. The inclusion of additional services is limited only by the imagination of the programmers who create the system's software. The reader wishing a fuller description of the ARTS System is directed to Dr. Kenneth Ingham, Protestant Guild for the Blind, 456 Belmont Street, Watertown, Massachusetts 02172.

Computer Services for the Blind

Dr. Ingham's objective is the deployment of the ARTS System throughout the United States. He has recently received financial backing from the Protestant Guild for the Blind and is actively pursuing this objective. He is currently arranging for the delivery of ARTS services to blind clients in the greater Boston community. On a recent visit to Dr. Ingham's laboratory, Dr. Emerson Foulke, Director of the Perceptual Alternatives Laboratory at the University of Louisville, became acquainted with the capabilities of the ARTS System. On his return to Kentucky, he proposed to Mr. T. V. Cranmer, Director of the Division of Services for the Blind, State Department of Rehabilitation Services, that ARTS services also be made available to the blind citizens of Kentucky. Because he was impressed with the potential of the ARTS System for providing rehabilitative and educational services for blind clients, Mr. Cranmer organized a group including blind practitioners in professions and professional workers in the education and rehabilitation of blind persons, and arranged for this group to visit Dr. Ingham's laboratory in order to gather more detailed information about the services that can be delivered by the ARTS System and the cost associated with the delivery of such services. This group was convinced of the economic feasibility of the system, and impressed with its enormous potential as a tool for rehabilitation and education. Consequently,

this group became a steering committee, with Dr. Foulke as its chairman, and this committee has developed the following plan.

A public corporation, to be known as Computer Services for the Blind (CSB), is to be formed. This corporation will be governed by a board of directors qualified by their interest, ability, and experience to render such a service. A bill, a copy of which is included in this document, will be presented to the State Legislature for consideration when it next meets. Passage of this bill will provide the money needed to purchase the computing machinery and other equipment required for the establishment of the ARTS facility, and to provide CSB staff salaries for the first two operating years. It is estimated that by the end of the second year, CSB will be serving 300 blind clients in the State of Kentucky. A user charge of $2.00 per hour will be made, and the corporation expects to be self-sufficient by the end of the second year.

The ARTS facility will be located in Louisville, because the Louisville community affords the highest concentration of potential clients who could gain access to the system through local telephone service. If the ARTS facility were located elsewhere, these clients would have to gain access over long distance telephone lines, and operating expense would be greatly increased. Clients living elsewhere in the state will have to gain access over long distance lines, but long distance costs will be charged to CSB, and not to clients.

A university provides an ideal context in which to locate an operation such as CSB. A university stores in its libraries much of the information, and includes on its faculty much of the expertise that would be useful to CSB staff in its operation of the facility. The University of Louisville has agreed to make available, without charge, secure and properly maintained space in which to locate the ARTS facility to be operated by CSB. The University's contribution will include the space needed to accommodate two staff members, the computing machinery, and storage of computer software and other records. The University's maintenance of this space will include heating in the winter, cooling in the summer, the custodial service required to keep it clean, and surveillance by the University security division. CSB will furnish and equip the space and meet all other operating expenses.

There is little doubt that the ARTS System will prove economically feasible. There is good reason to believe that it will have become self-maintaining by the end of the second year. The services it provides to blind clients throughout the state would be much more expensive if made available in conventional ways. Beyond this, its role as an educational and rehabilitative tool challenges the imagina-

tion. It will convert many blind recipients of public assistance to employed taxpayers. Over the years, the reduced demand on public assistance funds and the increased contribution of tax income to the state treasury will amount to a very considerable practical benefit to the State of Kentucky. An even more significant return will be the sense of personal worth and achievement experienced by those who, in large measure, owe their success as students and practitioners in useful occupations and professions to the services made available through CSB. The State of Kentucky is being requested to fund the initial operation of CSB in the belief that it will make a significant contribution to the well-being of generations of Kentucky citizens.

APPENDIX C

The Audio-Tutorial Method

Emerson Foulke
Perceptual Alternatives Laboratory
University of Louisville

Description of the Method

This is a proposal to present the introductory course in psychology by the Audio-Tutorial method, as developed by Dr. S. N. Postlethwait, a professor of biology at Purdue University. Under this approach, the content of a course is divided into a large number of internally coherent segments, and these segments are arranged in a logical sequence. Each segment is carefully considered in order to determine: (a) the best way to present and explicate its content; and (b) what would constitute evidence of mastery of that segment's content. Each student works in a carrel, where he finds a desk, writing materials, a tape player operated by foot pedals, earphones, and a collection of materials especially chosen for their usefulness in promoting the comprehension appropriate to a particular segment. These materials might include a collection of leaves, a few microscope slides and a microscope for viewing them, a kit of electronic components and a voltmeter, a group of chemicals, or a set of Rorschach cards. Before going to the carrel where a particular course segment is to be studied, the student receives a sheet of paper, containing a written statement of the behavioral objectives appropriate to that segment. That is, the paper tells him what he must be able to do in order to demonstrate mastery of the segment. At the carrel, he puts on his earphones, presses a foot pedal, and begins to listen. He hears the voice of his instructor, who begins to guide him toward the discovery of the content of the segment he is to master. The instructor will give him some facts, but he will also ask him questions, and show him how to use the materials assembled for his use to develop the information needed in order to answer those questions. The instructor will also assist the student in developing procedures for finding out what he, the student, knows and what he doesn't know about the subject matter of the segment at hand. At any point in this process, the student may retrace by listening to all,

or parts, of this tape again, or by working with all, or some, of his materials again. Furthermore, if the instruction provided by the tape is not clear to the student, he may seek assistance from an instructor, one of whom is always on duty while the carrels are in use.

When the student has received the information and carried out the instructions contained on the tape, he has finished that segment of the course. However, he cannot advance to the next segment, until he has given satisfactory evidence that he has mastered the segment just finished. He provides this evidence in a small group testing session, held once each week. First, there is an oral examination, in which the instructor directs questions concerning the content of the segment to the various group members. Elaboration of one student's answer by other group members is encouraged, and answers are discussed, challenged, and defended. Questions not correctly answered by any group member may be answered by the instructor, or may define the objective for a further work assignment. Following the oral examination, each student takes a short written examination designed primarily to permit him to demonstrate his mastery of the facts appropriate to the segment covered by the test.

If the student passes both the oral and the written examination, he has demonstrated a "C" level of mastery, and may advance to the next segment of the course. If he fails the test, he must spend additional time on that segment, and attend the small group testing session again. In preparing for his second examination, he has at his disposal, all of the resources that were available to him the first time. Since he has encountered difficulty with the segment, he may wish to request increased assistance from the instructor on duty.

In addition to individual study sessions, and small group testing sessions, there are occasional general assembly sessions, attended by all of the students in the course, in which material best presented by means of lectures is given. These lectures will probably be given by the course instructor, although guest lecturers may sometimes be called upon.

For those students who wish to demonstrate higher levels of mastery—"A" level or "B" level—two or three additional tests, more comprehensive in nature, are given during the course of the semester. In addition to providing evidence of fact mastery, these tests are designed to explore the student's ability to organize information, distinguish between relevant and irrelevant information, draw conclusions and implications, detect and demonstrate knowledge of relationships, etc. If a student elects to take these tests and fails, he has not jeopardized his "C" standing. He has only failed to demonstrate mastery at an "A" or "B" level.

Following are some of the advantages of the system just described. Although each student proceeds at his own pace, all students who finish the course achieve at least a "C" level of mastery. Students vary, then, not with respect to whether or not they achieve mastery, but with respect to the amount of time required to achieve mastery. Because an instructor is always on call at those times when students have access to the carrels, the instructional program provides sophisticated branching operations, not available in rigid, predetermined courses of programmed instruction. Student performance on each segment of the course provides fairly precise and immediate feedback for use by the instructor in further refining the organization and presentation of each segment in order to improve its effectiveness as a learning experience. Moreover, since each segment can be modified at any time, the course can easily be updated.

Levels of Mastery

Since the most important objective of the Audio-Tutorial method is to ensure mastery, it becomes particularly important to decide about the kind of evidence that will be considered in determining levels of mastery. The following suggestions for evidence of mastery are preliminary, and in need of further development. Nevertheless, they should serve to indicate the general approach.

1. The student must demonstrate that he knows the facts about the objects and events under consideration in the course, and some of the relationships among these objects and events.
2. The student must be able to achieve a useful arrangement of these facts, and to communicate this arrangement to others. A typical demonstration of this ability is provided when a student answers an "essay question." A good answer to a question of this type includes the relevant facts, excludes irrelevant facts, and organizes the relevant facts according to a useful logic.
3. The student must be able to draw conclusions from a given set of facts. Typical examples might be the solution to an algebra problem, the result of mixing two or more chemicals together, the consequence of crossing two plants, the estimation of a particular author's philosophy of history on the basis of the positions he has taken with respect to specific events, the determination of the school of art to which a particular painting should be assigned, etc.
4. The student must be able to relate facts not related for him by the instructor, the book, etc. He must combine facts presented in a given segment of the course or, at a more advanced level,

draw together facts from different segments of the course and from other sources, such as books.

5. The student must be able to employ the facts, concepts and skills acquired during the course of instruction creatively. He must be able to plan and execute an informative and useful experiment, or write a composition with literary merit, or produce a painting or musical composition that has artistic worth, etc.

The student who meets the first two criteria provides evidence for mastery at the "C" level. The purpose of the small group testing sessions is to obtain such evidence. The student who, in addition, meets the next two criteria satisfactorily, provides evidence for mastery at the "B" and possibly the "A" level. The student who satisfactorily meets the fifth criterion, as well, clearly shows mastery at the "A" level. The longer examinations mentioned earlier, two or three of which are given during the course of instruction, provide the student with the opportunity to demonstrate mastery at the "A" or "B" level.

Anticipation of a Criticism

It is generally agreed that the teacher performs two functions—instruction and evaluation. In the background section of this proposal, it was suggested that the use of the traditional lecture method emphasizes evaluation and de-emphasizes instruction. As a matter of fact, if measurement and evaluation were the primary objectives, a good strategy would be to present a standard experience, such as a series of lectures, to a group of students differing widely in learning aptitude, because under those conditions, the distribution of scores on a test covering the content of the lecture series should be an accurate reflection of the distribution of differences in learning aptitude and motivation in that group. The test would indicate that a few students had gained little or nothing from the lecture series, but nothing would be done about it except to record the fact on the student's transcript and on his grade report. The extent to which this cheerless news constitutes a salutary experience is open to question.

As a contrast, the Audio-Tutorial method emphasizes instructional objectives. Evaluation is an integral part of the method, but evaluation is not regarded as an end in itself. The student must also achieve course mastery. Because every student who completes the course achieves this objective, there are no "F's" to disperse at the end of the course. If a student does not complete the course by the end of the semester, he merely receives a grade of "Incomplete," and

this grade is removed as soon as he completes his work. Since no student can finish without showing mastery, each student completing the course experiences success. Students who do not complete the course within the allotted time are not confronted with final, negative judgments regarding their abilities. Each student is simply reminded that he has not yet completed his work, and he knows that he will receive a satisfactory grade as soon as he does so.

It may be objected that this approach emphasizes instruction at the expense of evaluation. The university has the sometimes unpleasant, but unavoidable responsibility of determining differences among its students with respect to academic ability, and of communicating this information to those who have a legitimate need to know. By making course completion contingent upon mastery, and by excluding failing grades as possibilities, differences among students are obscured so that reliable information about academic ability cannot be obtained. However, this is not a fair criticism. It is true that the usual distribution of test scores is not available, but there is information about how difficult it has been for each student to meet course criteria. For instance, there is for each student a record of the number of times it was necessary to test him in order to obtain the evidence of mastery for each segment, and, if he has received a grade of "Incomplete," there is a record of the time taken by him to remove that grade. Information of this sort, if properly considered, may permit judgments about academic ability that are at least as reliable as judgments based on more conventional information. The teacher will know how well the student has done, something about how difficult it was for him to do that well, and that he has done well enough to meet at least minimum standards of acceptable performance.

The foregoing remarks have pertained primarily to the student of modest ability and uncertain motivation. It is this student who is most likely to be neglected by the conventional lecture method. Unfortunately, the majority is constituted by students of this type. The superior student will prosper under either method. In fact, he will succeed in spite of the method.

APPENDIX D

Commercial Materials for Reading by Listening

I. Pre- "Reading by Listening" activities and allied skills

A. Auditory discrimination

1. Identifying sounds other than words

Early Childhood Record Series (Kimbo). Series 10. No. LP7010. $5.95. Numbers, instruments, nursery rhymes, sounds of the city, jungle animals, and farm animals.

I Heard It with My Own Ears (Miller-Brody). 12 cassettes. No. T4003. $137.50. Familiar and not so familiar sounds. City, music, animals.

Buzzer Board (DLM). No. W135. $8.50. Nonverbal auditory discrimination. Uses short and long signals in simple, then complex patterns.

See-Through Sound Cylinders (Maplewood). No. 7004. $7.00. Twelve clear plastic cylinders to be filled to produce a variety of sounds when shaken.

3. Localizing sound sources

Audi-Ball (Constructive Playthings). No. AB30. $8.50. Eight-inch ball containing large bell. Soccer ball construction.

Early Childhood Record Series (Kimbo). Series 13. No. LP7013. $5.95. Stories and songs presenting concepts of distance, measuring, and so forth.

Basic Training in Auditory Perception (Concept Records). Vol. 1. $5.95. Varying pitches, intensities, and tempos.

4. Hidden sounds

Basic Training in Auditory Perception (Concept Records). Vol. 2. $5.95. Distinguish environmental sounds; respond to relevant sound.

5. Identifying sounds within words

Listening with Mr. Bunny Big Ears (Educational Activities, Educational Record Sales, Kimbo). Six 12-inch records. $29.95. Dramatic play emphasizes a particular sound.

Listen and Learn Speech Improvement (Educational Record Sales). Four 7-inch records. $10.00. Sammy Snake and so forth. Songs and stories.

B. Descriptions

Building Verbal Power (Educational Record Sales). Album 4. $4.98. Encourages use of descriptive language through experiences with nouns and verb modifiers.

C. Follow directions

Listening Skills Program (SRA). Grades 1-6. Twenty-four lessons for each grade. Cassettes, $496. Open-reel tapes, $332. Records, $264.

Primary grades: Awareness of pitch and volume, developing sentence patterns, concept that sound implies action, use of context to develop vocabulary, awareness of fantasy.

Intermediate grades: Auditory discrimination, instant recall, following directions, remembering sequence, listening for main idea and remembering details, cause and effect, visualizing and listening for mood, inferring information, distinguishing fact from opinion.

D. Listen for rhyme, rhythm, and colorful combinations of words

American Encyclopedia of Learning Through Music (Miller-Brody). Six 12-inch records, $4.95 each. No. 100/6. Cassettes, $5.95 each. No. 1001/6C. Conceptual, motivational program set to music. Time, seasons, habits.

Early Childhood Record Series (Kimbo). Series 5-9. No. LP7005/9. $5.95 each. Christmas, fairy tales, marches, song of the sea, all-American.

The Child and His World (Society for Visual Education). Albums 10-15. Two records or cassettes. Each set $11.50 or $15.50 (cassettes). Roles as family members, students, and friends in singing story-lessons.

E. Associations

Building Verbal Power (Educational Activities, Kimbo, Educational Record Sales). Album 1. Exercises and games dealing with opposites, sentence completion.

F. Auditory closure

Meet Mr. Mix-up (Educational Activities, Educational Record Sales), 12-inch record, $7.95. Cassette, $8.95. In music and rhyme, students spot mistakes and omissions.

Building Verbal Power (Educational Activities, Kimbo, Educational Record Sales). Album 1. Exercises and games dealing with opposites, sentence completion.

H. Listen with involvement

Who Said It? (Educational Activities). One record and picture cards. $10.00. Four situations teaching listening, discrimination, deciding, and answering.

I. General

What is Listening? (Educational Record Sales). One 12-inch record. $5.95. Teaches not only the "how" but the "why" of listening.

II. Comprehension

Listening Skills Program (SRA). Grades 1-6. Twenty-four lessons for each grade. Cassettes, $496. Open-reel tapes, $332. Records, $264.

Primary grades: Awareness of pitch and volume, developing sentence patterns, concept that sound implies action, use of context to develop vocabulary, awareness of fantasy.

Intermediate grades: Auditory discrimination, instant recall, following directions, remembering sequence, listening for main idea and remembering details, cause and effect, visualizing and listening for mood, inferring information, distinguishing fact from opinion.

EDL Listen and Think Program (EDL). Grades 1-9. Fifteen open-reel tapes, $97.50. Cassettes, $107.50. Also available adapted by APH.

Level 1-2: Develop listening and thinking skills such as recognition of concepts of space and time, cause and effect, alike-different, and serial order.

Level 3-6: Identifying main ideas, recognizing sequence, summarizing, comparing, recognizing cause and effect, predicting outcomes, using senses, understanding character, understanding setting, recognizing foreshadowing, sharing feelings, enjoying humor, recognizing speaker's purpose, fact and opinion, visualizing, drawing conclusions.

Level 7-9: Understanding character, setting, conflict, theme, qualities of literature, recognizing foreshadowing and climax.

Alameda County PACE Center Listening Project (Alameda). Training materials for listening skills for grades 2, 5, 8, and 11. Based on language comprehension skills A through J.

Building Verbal Power (Educational Record Sales). Records. $4.98 each.
- Album 3: Develops ability to think categorically and to reason verbally through training in construction and use of simple similes and analogies.
- Album 5: Practice arriving at word meaning through context clues.

Comprehension Through Listening (Educational Record Sales). Records. $4.98 each.
- Vol. 1: Listen for main idea and subordinate idea in selections.
- Vol. 2: Expand skills in listening selectively.

Auditory Training Records (Maico).

My Weekly Reader—Listening Comprehension Paragraphs (American Education Publications). 1966. 4th, 5th, 6th grades.

Company Addresses

Alameda County Schools Curriculum Library, 224 West Winton Avenue, Hayward, California 94544

American Education Publications, 1250 Fairwood Avenue, Columbus, Ohio 43206

American Printing House for the Blind, 1839 Frankfort Avenue, Louisville, Kentucky 40206

Childcraft Education Corporation, 964 Third Avenue, New York City, New York 10022

Children's Music Center, Inc., 5373 West Pico Boulevard, Los Angeles, California 90019

Concept Records, Box 524, North Bellmore, New York 11710

Constructive Playthings, 1040 East 85th Street, Kansas City, Missouri 64131

Creative Playthings, Princeton, New Jersey 08540

Developmental Learning Materials, 3505 North Ashland Avenue, Chicago, Illinois 60657

Educational Activities, Inc., P.O. Box 392, Freeport, New York 11520

Educational Development Laboratories, Coast Visual Education Co., 5610 Hollywood Boulevard, Los Angeles, California 90028

Educational Progress Corporation, P.O. Box 45663, Tulsa, Oklahoma 74145

Educational Record Sales, 157 Chambers Street, New York City, New York 10007

Educational Teaching Aids, A. Deagger and Company, 159 West Kinzie Street, Chicago, Illinois 60610

Ginn and Company, 125 Second Avenue, Waltham, Massachusetts 02154

Imperial International Learning, Box 548, Kankokee, Illinois 60901

Jeri Productions, 1213 North Highland Avenue, Suite 209, Los Angeles, California 90038

Kimbo Educational Records, P.O. Box 55, Deal, New Jersey 07723

Listening Library, Inc., 1 Park Avenue, Old Greenwich, Connecticut 06870

McGraw Hill, Webster Division, Manchester Road, Manchester, Missouri 63011
Mafex Associates, Box 519, Johnstown, Pennsylvania 15907.
Maico Company, 21 North Third Street, Minneapolis, Minnesota 54401
Maplewood Products Co., Inc., 119 Foster Street, Peabody. Massachusetts 01960
Media, R/A, Inc., Box 2067, Van Nuys, California 91404
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National Center for Audio Tapes, Bureau of Audio-Visual Instructions, University of Colorado, Boulder, Colorado 80302
Peripole Record Corporation, 51-17 Rockaway Beach Boulevard, Far Rockaway, New York 11691
Play and Learn, 9015 Fullbright Avenue, Chatsworth, California 91311
Playtime Equipment Company, 808 Howard Street, Omaha, Nebraska 68102
Science Research Associates, Inc., 259 East Erie Street, Chicago, Illinois 60611
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