THE EFFECTS OF A PHYSICAL EDUCATION PROGRAM ON AUDITORY DISCRIMINATION ABILITY, VERBAL AND NON-VERBAL, OF KINDERGARTEN CHILDREN

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This is to certify that the

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ABSTRACT

THE EFFECTS OF A PHYSICAL EDUCATION PROGRAM ON AUDITORY DISCRIMINATION ABILITY, VERBAL AND NON-VERBAL, OF KINDERGARTEN CHILDREN

By

Mildred B. Evans

Summary

The primary purpose of this study was to investigate the effects of a planned physical education program on auditory discrimination ability, verbal and nonverbal, of young children at the kindergarten level. Two subpurposes were: (1) to design a sequential auditory discrimination training program for the physical education and for the classroom learning experiences at the kindergarten grade level, and (2) to examine the relationship between verbal and nonverbal auditory discrimination ability, reading readiness, and sex.

The Wepman Auditory Discrimination Test for verbal assessment, the TENVAD Test for assessment of nonverbal auditory discrimination, and the Metropolitan Readiness Test were administered to 66 children enrolled in three kindergarten classes in the Bolivar, Missouri, public

school system. Post-tests, alternate versions of the Wepman and Metropolitan, and the same version of the TENVAD were administered six weeks later. Students were assigned at random to one of the treatment groups: Experimental Treatment Group I (physical education class designed to improve auditory discrimination ability), Experimental Treatment Group II (classroom procedures designed to improve auditory discrimination ability), and the Control Treatment Group (regular classroom procedures with recess). Randomization was accomplished using the following procedure: Children were grouped on Wepman Test results in rank order; triplicates were obtained by selection of the top three scores for boys, which became triplicate one, the next highest three scores became triplicate two, etc. Following the matching procedures, each boy within the triplicates was assigned at random to one of the three treatment groups (Experimental Treatment Group I, Experimental Treatment Group II, or the Control Treatment Group. The same procedure was used for the girls.

The data were analyzed using the following statistical procedures: (1) correlations were run using the post-test scores on the Wepman, TENVAD, and Metropolitan Readiness Tests for boys (N=33) and for girls (N=33), and (2) covariance in a nested factorial design of the Wepman, TENVAD, and TENVAD sub-test titled Rhythm was used to investigate average change between the three groups and

the effects of sex. Each of the Experimental Treatment Groups and the Control Treatment Group had an N of 22 (N=11 boys and N=11 girls).

Findings

The findings of this investigation, presented within the context of the limitations imposed by the design of the study were:

1. Auditory discrimination ability, both verbal and non-verbal, is related to reading readiness at this age: with verbal ability having the highest relationship with readiness; with girls having higher relationship on all variables compared to boys. The correlations were low but fell within the range of other studies.

2. Significant differences found for the nonverbal auditory discrimination ability (TENVAD) were between the experimental classroom program designed for auditory discrimination training and the control classroom for treatment, sex, and interaction between sexes. The children in the controlled classroom appeared to show greater change in auditory discrimination ability, with girls showing greater change than boys (based on examination of the adjusted mean scores).

3. Significant differences for sex were found among the Experimental Treatment Groups and the Control Treatment Group for Rhythm (TENVAD Sub-test). The differences for boys appeared to indicate greater change from undergoing

the experimental physical education program and least change in the controlled classroom. The girls' results showed no consistent pattern of change.

4. From the results of the teachers' subjective evaluations of the changes occurring in the children's listening skills, as assessed in this study, the lesson progression for auditory discrimination training, and methodology or teaching style employed in presenting each lesson, the following findings appear justified:

   a. Poorer listeners appear to improve in listening skills as assessed in this study more than better listeners.

   b. Boys appear to improve more than girls in the listening skills assessed in this study.

5. Kindergarten children were capable of understanding and responding to the test items in the Wepman and the TENVAD Tests. The TENVAD and the Birch-Belmont Test needs to be refined and in the mechanics of administration in assessment of kindergarten children.

6. The sequential program for kindergarten children in auditory discrimination ability designed for the classroom and for the physical education program was viable. The one factor affecting the viability of the program was motivation; i.e. the intensity of the program, in a six-week period did not allow the children opportunities to attend to and respond to other types of stimuli in their learning experiences.

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TABLE OF CONTENTS

LIST OF TABLES

Table Page

CHAPTER I

INTRODUCTION

Educational authorities are generally in agreement that adequate perception is a prerequisite for learning. Reading, the basic skill of formal education, is dependent upon visual discrimination, auditory discrimination, and a meaningful vocabulary (14, 15, 17, 24, 32, 45, 52). The recent literature has indicated that a structured physical education activity program in early childhood may contribute to academic achievement in school, namely to reading and to reading readiness (8, 28, 30, 34). The content of these structured physical education activity programs reported in the literature included a variety of movement tasks:

1. Physical fitness exercises (8)
2. Sensory and perceptual-motor training (8, 28, 34)
3. Balancing activities (8, 34)
4. Basic concepts presented in problem-solving method (30)

Educators, experimentalists, and clinicians have all taken an interest in the use of physical activity to enhance various perceptual attributes related to reading, especially visual discrimination (8, 10, 23, 34). It is recognized that reading ability may be faciliated by auditory

discrimination (14, 43). To date, little or no work has been reported in the literature investigating the effects of a structured physical activity program on auditory discrimination.

The present study was designed to provide information as to whether or not a structured physical education activity program at the kindergarten level can influence auditory discrimination.

Statement of the Problem

The primary purpose of this study was to investigate the effects of a planned instructional program in physical education on auditory discrimination ability, verbal and nonverbal, of children at the kindergarten level in school.

Subproblems

1. To plan, implement, and compare the effects of a sequential physical education program and of a planned classroom program designed for auditory discrimination training of children at the kindergarten level.
2. To explore the feasibility of using certain techniques for measuring auditory discrimination abilities at this age level.
3. To examine the relationships among auditory discrimination ability and readiness for boys and girls at this age level.

Hypotheses

1. Auditory discrimination ability test scores are correlated at the kindergarten age level:

1.1 Verbal and nonverbal auditory discrimination test scores are correlated with one another at this age level.

1.2 Verbal and nonverbal auditory discrimination test scores will show varying degrees of correlation, depending upon the sex of the child.

1.3 Verbal and nonverbal auditory discrimination test scores will be correlated with readiness at this age level.

2. Significant differences will result in auditory discrimination test scores, verbal and nonverbal, and readiness of children who undergo auditory discrimination training programs at the kindergarten age level:

2.1 Treatment effects will favor those children undergoing a specially designed physical education program, compared to a specially designed classroom program.

2.2 Treatment effects will vary with sex.

Limitations of the Study

The data for this study were obtained on all students enrolled in the three kindergarten classes of one public school district, primarily rural in nature.

The population was limited to students 5 years and 6 months to 6 years and 6 months of age. The total population was comprised of 66 students, of which 33 were boys and 33 were girls. Because of the sample size, randomization of male and female factors in comparing treatment effects was curtailed.

The facilities, classrooms, teaching stations, and time of day during which classes were scheduled were limited to existing conditions.

The class size was one teacher for every 30 students. One teacher was used for the experimental groups. Three regular classroom teachers taught the control group on a rotating basis.

The instruments used for collection of data, namely the standardization of the TENVAD and Birch-Belmont tests for kindergarten level, were not available.

The treatment programs were limited to a six-week period. A period of time was involved for kindergarten children to respond to a problem-solving teaching style for the classroom activities and for the physical education activities.

Terminology

1. Auditory discrimination: the ability to separate sounds. This ability includes recognizing differences in sounds and the pauses between sounds; for example, hat vs bat, and tap (pause) tap tap vs tap tap (pause) tap.

   Verbal auditory discrimination: the ability to separate sounds that are components of human speech; for example, to recognize a "b" sound from a "p" sound.

   Wepman Test (63): the tool used for assessment of verbal discrimination.

   Nonverbal auditory discrimination: the ability to separate sounds that are made by means other than human speech; for example,

to recognize the difference between a high and low tone when listening to a musical instrument.

TENVAD (7): the tool used for assessment of nonverbal auditory discrimination.

2. Auditory integration: the ability to identify visual patterns taken from auditory patterns; for example, to listen to different tapping patterns and recognize the pattern in print - .. - vs ..- .

Birch-Belmont (4): the tool used for assessment of auditory interpretation.

3. Readiness: the state of being ready for formal instruction in reading.

Metropolitan Readiness Test (29): the tool used for assessment of readiness for formal instruction in reading.

4. Structured Physical Education Activity Program: a series of planned lessons consisting of gross motor movements as found in games, rhythms, mimetics, and basic locomotor and axial movements.

Locomotor movement: movements through space (walk, run, hop).

Axial movement: movements in space (turn, twist, bend).

5. Instructional method: the teaching style used in this study was problem solving.

Problem solving: The problem is posed by the teacher in terms of who can find a solution and how one can find a solution. The children explore their environment and answer the problem. The teacher guides their exploration and helps the student understand the "why." For example; who can make the letter "V" using their body and why does that body shape look like a "V."

CHAPTER II

REVIEW OF LITERATURE

Auditory Discrimination

Auditory discrimination has been defined as the ability to separate sounds. This ability is of primary importance in reading and speaking. Stauffer's evaluation of the ability was that, "Since oral language and its various sounds are so crucial in learning to read printed language it is imperative that auditory skills be carefully appraised and developed" (57, p. 153).

Durrell's opinion was that, "The major subskill in which nonreaders are weak is the ability to detect auditory patterns of spoken words. Most beginning reading failures are essentially auditory failures rather than visual failures" (14, p. 72). Eisenberg stated, "There is increasing evidence that children with normal pure tone auditory thresholds may nonetheless suffer from perceptual handicaps in discriminating speech, sounds, and defective intersensory integration" (17, p. 19). Hildreth assumed that auditory discrimination ability was solely dependent upon growth, but she clarified this idea later in her text when

she stated, "All normal children respond well to training in the ability" (29, p. 283). Kaluger and Kalson reported that, "In many ways, we consider the auditory modality to be most significant to the reading and learning process" (32, p. 149).

Auditory discrimination is essential in developing oral language (46,48,49). Myklebust emphasized the reciprocal relationship between hearing and speech: "Before a child can speak he must, first be able to hear, then to interpret what he hears, and thirdly, he must be able to relate these interpreted verbal symbols to the speech motor system" (46, p. 11).

Auditory discrimination is significant in analysis of environment. Wunderlich described the child who hears sound but does not obtain adequate meaning as one who "may not have had the appropriate environmental experiences to cause him to move on into more mature levels of function" (66, p. 703). The environmental experiences of a child provide the points of reference in understanding and giving meaning to new situations. Solov'ev stated that "Hearing aids in a more complete, broader, and fuller reflection of the environment . . . . Hearing enriches the analysis of objects and processes" (56, p. 124).

By the time a child is four to six months of age it is normal for the child to develop the ability to localize sound with eye and head movements (21). With the capacity to localize sound, the child becomes interested

in what is happening in his environment. As hearing becomes more discriminatory, sound increases in meaning. Ewing stated, "Less and less of what he hears is without meaning. . . . He reaches a stage when he no longer needs to look. Sound by itself has become meaningful" (18, p. 31).

Wepman Test for Auditory Discrimination (61)

Wepman's test for auditory discrimination was designed to identify the child who

> may be able to hear and get meaning from what he hears and yet be quite unable to discriminate many of the sounds that make up the speech he hears. . . . Such children and their number is felt to be great in the preschool and early school years; often have speech and reading problems, or both, although they have no apparent loss of hearing or limitation of intelligence (62, pp. 326-327).

The Wepman Test was reviewed by DiCarlo, and it was his opinion that "the test provides a quick and accurate assessment of auditory discrimination among children 5-8 years of age. The specificity of the task eliminates contamination of performance by auditory memory span" (12, p. 940).

The test consists of asking the child to listen to two words with the same number of syllables and say, or merely nod yes or no, if the words are alike or different. Some words are the same; some words are entirely different. The test is scored by counting as errors the number of times

a child indicates he hears the same word when the words are different.

The test is useful in identifying children in early elementary years who are slower than their peers in auditory discrimination. "Administration of the test to older five year olds and younger six year old children permits the selection of those who are likely to have difficulty learning to use the phonics necessary for reading" (63, p. 1).

Cut-off points, indicating inadequate development, were determined by testing 533 unselected first, second, and third grade children in both urban and nonurban schools. Reliability of the test retest was +.91 (N = 109). The reliability of each phoneme on the two forms showed a Pearson rank order correlation of +.67 (N = 214).

The validity of the test: (1) The correlation between auditory discrimination and intelligence was +.32 (Pearson product-moment) (N = 145). One of the studies in which the Pearson product-moment correlation was used was reported in the test manual:

> Of eighty children in the first grade of a non-urban consolidated school, twenty-two showed inadequate auditory discrimination for their age. The differences in auditory discrimination and in reading were significant (1 per cent level), while the difference in I. Q. was not significant (63, p. 3).

Test of Nonverbal Auditory Discrimination (7)

The purpose of the test is to develop group screening devices in the area of auditory discrimination in order to assess auditory perceptual ability and identify potential learning disabilities.

> Tenvad is intended to be a useful tool that will yield operational and descriptive results which will lead to instructional programs in the primary grades. The fact that it is a group administered test that can be administered by, scored, and interpreted by teachers with a small amount of training, should lend itself to application in a school setting as well as to be used as a clinical tool (7, p. 2).

The test is nonverbal and consists of 50 pairs of tones in five subtests--Pitch, Loudness, Rhythm, Duration, and Timbre, each having 10 pairs of tones. Administration of the test is relatively simple and can be group administered (10 kindergarten maximum recommended). The stimulus materials are on tape. Each child has a test booklet on which he records his responses.

Standardization is based on a sample followed over a three-year period. The sample was made up of children in three school districts in a large metropolitan area representing a "composite socio-economic rank." Children repeating grades and those suspected of having a hearing impairment were eliminated from the analysis. Reliability based on Kuder-Richardson, Formula 20 for age 6 (N = 495) was +.75. There are few test measures available for external validation. The correlation between TENVAD and

the Wepman Auditory Discrimination Test was r = .40. The correlation between TENVAD and I. Q. (as measured by SRA Primary Mental Abilities) was r = .45 (7).

The degree to which reading achievement can be predicted in primary grades (Metropolitan Achievement Test) is: (1) word knowledge .47, (2) word discrimination .51, and (3) total reading .51. TENVAD accounts for 26 per cent of variance in first grade reading achievement.

In a later study the TENVAD test was used with the Visual Motor Integration Test in grades one through three with N = 120. The conclusions were:

> It seems that the group administered Test of Non-Verbal Auditory Discrimination and Visual Motor Integration Test will lead toward prevention of learning disabilities in the primary grades. Results should enable us to begin to explore optimal instructional methods for children in the primary grades based on auditory and visual perceptual propensities in order to maximize academic development (7, p. 6).

Auditory Integration

Auditory and visual senses function together quite early in child development. "In normal child development exploration of the auditory environment is necessarily and closely related to capacity to explore the visual environment" (18, p. 29). "Binaural response to sound outside the field of vision informs or warns a person and the head and eyes are then turned and focused on the sound producing events" (18, p. 29).

The research of Birch and Belmont (4) suggested that a learning disorder may stem not only from a lack of auditory discrimination, but from the lack of intersensory integration, "as in the task of converting auditory signals to visual signals" (17, p. 13). Birch and Belmont suggested that these deficits may stem from faulty auditory experience, as well as from central nervous system pathology. Eisenberg (14) felt that lack of ability to convert auditory symbols is associated with poor reading.

Birch and Belmont Test of Auditory Integration (4)

The purpose of the test used in the Birch and Belmont study was to obtain information on the developmental cause of audio-visual equivalence. Correlations were run between audio-visual, I. Q., and reading for grades 1-6 and for audio-visual and miscellaneous tests for kindergarten.

The test for auditory integration consists of administering an auditory tap pattern with no visual clues. The testee must select the visual dot pattern that matches the auditory tap pattern from the three dot patterns before him.

The results of the test: The mean number of correct responses at K was 4.1, with 70 per cent of the children functioning at levels not much better than chance. Percentage of kindergarten subjects who passed each test item was recorded, ranging from 20 per cent passing item

one to 57 per cent passing item 6. Improvement occurred at each grade. The most rapid improvement occurred during the period K to 2nd grade. The correlation of the AVI test and I. Q., as measured by Otis Quick Scoring Test of Mental Ability in grades 1-6 and miscellaneous test for kindergarten, was as follows: K - .11, 1 - .56, 2 - .42, 3 - .57, 4 - .41, 5 - .34, and 6 - .28.

The findings of the test were interpreted to indicate that the development of auditory integration has specific relevance to reading, although it is not the sole factor underlying reading competence. Within two groups of readers, those children with lower auditory-visual performance tended to have lower reading scores. "Learning to read is an educational task that requires the ability to transform temporally distributed auditory patterns into spacially distributed visual ones" (4, p. 858).

Metropolitan Readiness Tests (29)

One's goal in improving auditory discrimination is ultimately to improve the ability to learn and read. The Metropolitan Readiness Test is a widely accepted instrument for determining some of the child's basic skills that are considered essential requirements for reading.

> Metropolitan Readiness Tests were devised to measure the extent to which school beginners have developed in the several skills and abilities that contribute to readiness for first-grade instruction. Designed for testing pupils at the end of the Kindergarten year, these tests provide a quick, convenient and dependable basis for early classification of pupils (29, p. 2).

The six tests included in the Metropolitan Readiness Tests are Word Meaning, Listening, Matching, Alphabet, Numbers, and Copying.

Correlations found between Metropolitan Readiness Tests and intelligence tests ranged from 167 to .72 with the Otis-Lennon Mental Ability Test. When the Metropolitan Readiness Tests were correlated with the California Test of Mental Maturity the correlation was .66, and when correlated with the Stanford-Binet Mental Age Test the correlation was .67. The Goodenough-Harris Drawing Test correlation was the lowest, with .43.

When considering the relationship between readiness tests and achievement at the end of grade 1 and at the end of grade 2, the Stanford Achievement Test correlations with the Metropolitan Readiness Tests ranged from .43 to .60.

The predictive validity of the Readiness Tests differed across groups.

> An overall estimate would place the prediction at a level of at least .60, a value that must be considered as very good for test results for five- and six-year-old children who are in almost every instance taking their first group administered test (29, p. 23).

The test-retest reliability between the two forms of the Readiness Test was .91. A slight increase in score of approximately one point of total score up to a score of 45, and approximately two points for scores of 46 and above can be attributed to practice effect when the second test is given a week or so after the first test.

Auditory Discrimination and Movement Experience

Can opportunities for sensory experiences in physical activity change auditory discrimination; and if change occurs, will readiness for formal instruction in reading be affected by this change?

Auditory Discrimination: Development and Learning

Cronbach, in discussing Piaget's separation of "development" from "learning," stated that since Piaget's theory did not deny that intellectual development involved learning, then in principle it ought to involve instruction. He further stated,

> I think all of us would say that there must be experiences we can give at the age of two or seven or thirteen that would be suitable to promote this type of development . . . this second order transfer (11, p. 76).

Lawrence Frank, in a discourse on maturation and nature, rejected the Rousseauistic concept by asserting that

> Human nature is what each cultural group makes of man's potentialities guided by what it believes about, expects of, and does to and for children and youth. Probably the majority of individuals are functioning far below their capacities, physical, mental and creative (19, p. 28).

School systems are often administratively governed with the underlying philosophy that one must let the child develop, and when he reaches a certain maturation level, he will begin to learn effectively. For instance, many school systems economically wait until the third grade

before beginning remedial reading. This waiting period is to take care of so-called "late-bloomers." Eisenberg commented that

> This 'economy,' however, must be balanced against the cost of those children who by the third grade, are deeply imprisoned in faulty learning habits, have become convinced of their ineptness, and now respond to any but the most expert individual instruction (17, p. 19).

Bond and Wagner recognized that sensory deficiencies may be transitory, "But even a transitory difficulty may cause differences in learning ability" (5, p. 147). Cotterall and Wiese suggested incorporating into the beginning reading curriculum perceptual experiences:

> Although some authorities feel that an additional period for growth will solve this problem (perceptual difficulties), the author of this paper would propose that instead of waiting for maturational growth, a program of curricular experiences be developed to facilitate this process (10, p. 217).

Robinson (52), Sauer (55), and Monroe and Rogers (43) are among reading authorities who advocated development of listening skills. Monroe and Rogers suggested:

> If possible, the teacher needs to create a new atmosphere for listening--an atmosphere in which children want to attend to certain sounds, because it's fun to do so, and in which they want to develop sensitivity to certain sounds, because the ability to discriminate correctly leads to pleasant rewards (43, p. 68).

Movement Experiences: Development and Learning

Much needs to be learned about motor development and its relationship to perceptual and cognitive functions.

No one will deny that the young infant is not only moving and growing but also having experiences which are important for mental development. Such experiences come from the sense-organ stimulation. Hebb's (27) work provides substantial evidence that early experiences are determining factors in later perceptions. Hebb postulated that perception was not just a maturational aspect of development but also a learned experience, i.e., that the perceptual processes do not mature relatively independent of experience.

An increasing amount of attention in educational literature is being paid to the child's motor development and movement experiences. Theories and programs have emerged which suggest that movement experiences may be structured to aid learning in a general way. Proponents of this "school of thought" propose that perceptual and motor functions are inseparable and that training in movement or motor functioning will aid the child's learning (34,19,13). The proposed structured movement experiences have been called by various terms, such as perceptual-motor education, perceptual-motor training, sensory-motor training, motor sensory training, and so forth. Kephart, using Hebb's theory in his work on perceptual motor learning, postulates that the perception of stimulation and motor activity cannot be separated when one attempts to examine the nature

of perception. Furthermore, he postulated that it is impossible to separate the part of activity as motor from that which is perceptual; namely, perceptual learning is concomitant with motor learning.

In recent years many workers in the field have begun to evidence skepticism and rejection of any kind of perceptual-movement training. Details of information slowly being provided through research indicate that many channels are available for the child to collect information about his world, several of which are independent of the child's ability to move. Kilpatrick (35) suggested that infants organize their perceptions of the world about them in both direct and indirect ways. Kilpatrick (35) he contended that children can formulate judgments of space and events without the need for direct exploration via motor activity. But they may look, listen, and think about the events or objects to which they are exposed in their environment; i.e., it is possible to recognize, discriminate, and integrate visual and auditory stimulation without movement experiences.

The auditory therapists in schools for the hard of hearing agree upon the importance of play in learning. O'Neil said, "The child should listen actively" (48, p. 95), and Nieman counseled, "The lesson can and should be given in the nature of play" (47, p. 262). Salkin found that

"The development of a sense of rhythm is correlated with auditory training, speech exercises, and with rhythmic movements of the body in dances and games" (54, p. 62). Edenberg believed, "Hearing and speaking should develop in Play" (16, p. 590).

The reading authority, Monroe, implied that games did not improve audition, but did stimulate thinking.

> To be exact, the 'ear training' games and exercises that are such fun for children of kindergarten and first grade ages do not really train the ear in the sense of overcoming deafness or physical defect. They simply help children think more precisely about the sounds they hear (42, p. 117).

Much more research needs to be done, focused on movement and development of perceptual and intellectual skills. Auditory perception and the integration of auditory and movement functioning are rarely discussed. Structuring movement experiences for auditory perceptions and integration would requiring training the children to attend to verbal directions or to translate music into movement in dance or rhythm exercises. Such activities involve the simultaneous integration of kinesthetic (muscle sense) and visual perception in the total movement experience. It is contended by some workers in the field that the type of movement experience would be particularly valuable to promotion intersensory integration, i.e., auditory integration. The use of musical and percussive instruments

would be particularly applicable for promoting children's perception of pitch, loudness, rhythm, and musical sequence as well as stimuli for children to move.

Child growth and development literature is slowly providing information that fits into the concept that the child's control over his body grows out of the readiness of the body for learning, and out of the multi-sensory stimulation his environment provides (6). Implicit in this concept is the assumption that the child feels free instead of hampered in the use of his body; i.e., he feels free to seek activity which involves the uses of his emerging abilities as he explores, manipulates, and copes with the objects and events in his environment (6, p. 342).

Summary

In summary, movement experience and auditory discrimination ability were chosen as variables to investigate for these reasons: (1) auditory discrimination is a major skill in reading (14), (2) auditory discrimination is crucial in development of oral language (46), (3) auditory discrimination is significant in analysis of the environment; sounds by themselves provide one with information regarding his surroundings (64), (4) maximum development of perceptual abilities take place between the ages of approximately 3 and one-half to seven years (11), (5) the

development of perceptual abilities through integration of sensory messages overlaps with and is followed by the period of maximum development of language (1), (6) the physiological law of "use and disuse" is one of the bases for change in the development of sensory perception (64), and (7) early sensori-motor experience is the beginning of all learning (1, 21, 22).

It is contended that movement activities may be employed effectively as an important type of teaching tool for auditory training in elementary physical education. Secondly, it is contended that movement tasks in problem-solving situations in which the child is free to move, to explore, and to manipulate his environment in games and play-like activities facilitate auditory discrimination. Thirdly, it is contended that movement experiences per se will not result in changes in auditory discrimination unless the principles for transfer of learning are applied; i.e. changes will occur to the extent to which the child thinks and listens about the pitch, loudness, rhythm, and sequence of movements in which he is engaged.

Structured Physical Education Activity Program: A Rationale

In the medical profession much of what is known about preventive medicine in the healthy population is the result of treating the unhealthy population. Likewise, much of what we are learning about methods of teaching

the so-called "normal" student is often a product of experiences in teaching the atypical student (34).

The development of the experimental program for auditory training for the normal child has made full use of the knowledge and experience of the teaching therapist for the deaf.

Specialists in teaching the deaf agree on the importance of auditory training in the improvement of residual hearing in the deaf (3,9,49,53,57,61). Oyer realized that auditory training is needed for students with normal hearing, as well as atypical students.

> The need for auditory training mainly arises with those who sustain hearing loss; however, such training is not solely confined to those who suffer a hearing handicap. Some people have no such loss, but appear defective in speech, sound perception and production (49, p. 3).

The planned experimental treatment utilized in this study combined auditory training and auditory education. Auditory training was defined as "students offered selected parts of the real acoustical environment under best acoustical conditions in order to establish stable auditory memory" (21, p. 309); for example, the sound of alphabetical letters made without other distracting sounds being made within the hearing range. Auditory education was defined as "preparing the students for acoustical situations of perception under normal conditions" (21,

p. 309); for example, the sound of alphabetical letters made while other sounds are present in the hearing range.

Time Allotment

One cannot base the duration of a study upon the general auditory training period of the atypical, because in schools for the deaf, auditory training is continuous throughout the school years. However, one study reported from Russia (40) dealt with children who were not in schools for the deaf. The children were brought to a hearing clinic for a daily lesson over a period of one month. Improvement in residual hearing was noted. Three months later, there was a follow-up training period for 45 days; continued improvement in audition was observed.

Kellog recorded some improvement of listening skills in the San Diego Public Schools. The lessons consisted of 40 classroom lessons of 20 minutes each, over a semester of 18 weeks (33).

In an experimental program that has specific and limited objectives, one must consider the interest level, needs, and motivation of the normal child.

Progression

The progression employed in designing the physical education and classroom training program followed the pattern of auditory training in schools for the deaf. That pattern, in general, was derived from the sequence of

auditory development. The progression was (1) from pure tone to complex speech sounds (2,20,34,53), (2) from unisensory to combined sensory (16,67), (3) from single sound to selection of sound from increasingly louder background noise (48, 59), (4) from easy low vowel tone to hard high frequency consonant sounds (48,48,59), (5) from simple rhythm to complex rhythm with a varying pause criteria (34,42,48), (6) to perceive likeness as well as differences in sounds (37,51,57), and (7) from localization of sound in space to identity of sound without visual assistance (18,66).

The following chart illustrates the progressions, with examples of their application to lesson development. Each lesson is presented in Appendix A (p. 71).

Auditory Discrimination Lesson Development

Developmental Task Sequence	Physical Education Example	Classroom Example
1. From pure tone (a) to complex speech sounds (b)	a. The teacher used two sounds on the tonette to allow the students to compare space distance. Students closed their eyes and turned toward sound.	a. The teacher took a position in back of the students and moved right and left of an established midpoint in the room. The students were asked to mark on a paper tablet in the left or right hand column, according to the position of the sound. The teacher began by moving to the far right and the far left of midpoint and then moved less and less to the right and the left.
	b. The children played 'Crows and Cranes.' The class was divided into two groups (two lines). They stood about two feet apart. One line was named 'crows' and the other 'cranes.' If the teacher said crows, the cranes chased the crows to a safe line and vice versa. The children played 'Crows and Cranes' with different beginning and middle sounds (thrash-thrush).	b. The teacher said two words that were alike except for the beginning consonant. The children wrote the two consonants. If the words had the same consonant, the children made one letter. This was repeated, using different middle sounds. The children held up paper twins when the words contained the same consonant.
2. From unisensory (a) to combined sensory (b)	a. The children were asked to respond to an even drum rhythm of varying intensity by walking, jumping, and hopping.	a. Six children with instruments took a position at the back of the class. Each played in sequence and then all together. Members of the class, after they had listened without looking, would point to the instrument when asked by the teacher to identify an instrument.
	b. The children played 'Stop, Look and Listen.' The teacher held up a flash card with a letter of the alphabet. If the word she said began with that letter, all could run. If it did not begin with that letter, the children froze (stood still).	b. As the teacher held up an alphabet flash card, she said a word that either did or did not begin with that letter. If the word began with that letter, the children held up their hands. If it did not begin with that letter, there was no response.

Developmental Task Sequence	Physical Education Example	Classroom Example
3. From single sound (a) to selection of sound from increasingly louder background noise (b).	a. The teacher played various rhythms with the drum and the children responded by walking, running, and skipping. The teacher played the drum but added distractions such as noisemakers played by other children and other children clapping their hands for distraction. The children responded to a drum beat with locomotor motion.	a. While the teacher used the drum in a selected rhythm, the children clapped in time to the drum. Then a record was played at the same time to provide a distracting sound.
	b. The teacher told the story of 'City Noises.' She divided the class into groups that would make the different city noises (trucks rumbling, brakes squeeking, people walking, etc.). As the children began making their noises the teacher walked among them and held her hand in front of her mouth; very quietly she said "Arf, Arf." When the children heard the dog sound, they pretended to pick up a little dog and put him on a leash.	b. The teacher told the story of 'City Noises.' Then she gave each group of children a noise of the city to make. As each group made the noises, the teacher, with her hand over her mouth, quietly said "Arf, Arf." When the children heard the sound of the dog, they quit making their noise and drew a picture of a dog.
4. From easy low vowel tones (a) to hard high frequency consonant sounds (b).	a. The teacher said the vowels $\bar{o}$ and $\bar{u}$ and the students formed the letters with hands and fingers, traced them in the air, and then used their whole body to make the letter.	a. As the teacher said the vowels $\bar{o}$ and $\bar{u}$, the children made the letters on paper.
	b. The teacher used the consonants sounds (p, t, m, n, k) with various vowels and pupils responded in partners. One child made the consonant letter with some part of his body and the other child made the vowel letter with some body part.	b. The teacher used consonants (p. t, m, n, k) with various vowel combinations. The class responded by tables; the children at one table made the consonant letter on paper and children at a nearby table made the vowel letter.

Developmental Task Sequence	Physical Education Sample	Classroom Example
5. From simple rhythm (a) to complex rhythm with a varying pause criteria (b).	a. The children were asked to respond to even and uneven rhythm of a drum by clapping and by locomotor movement.	a. The children were asked to hold up a rabbit when the sound on the 'Clock Song' was fast and a turtle when the sound was slow.
	b. As the teacher said the names of students, using one, two, and three syllable names, the children responded to one syllable with a jump, two syllables with a hop, and three syllables with running.	b. As the teacher said words or names of students using one, two, or three syllables, the students responded by holding up one, two, or three fingers to match the word.
6. To perceive likeness (a) as well as differences in sounds (b).	a. The teacher read words that were similar and words that were alike. When the words were exactly alike, they froze.	a. The teacher said words that were similar or words that were alike. If the words were alike, the children wrote the letter of the last sound they heard.
	b. When the words were different, the children moved with varied axial movements.	b. If the word that the teacher said was different, they did not respond by writing.
7. From localization of sound in space (a) to identity of sound without visual assistance (b).	a. The teacher took a position in back of the students and made various instrumental sounds. The students, with their eyes opened, walked backward toward the sound.	a. The teacher assumed a position in back of the students and made pure tone sounds with a tonette. As the teacher moved left and right, the children indicated on paper whether the sound moved left or right.
	b. As a record was played by the teacher, she identified the horn, banjo, and drum. Then she asked the children to begin moving when the horn played and to stop moving when they could not hear that particular instrument. She then asked the children to respond in the same manner when they heard the banjo and drum.	b. As a record was played, the teacher identified the horn, banjo, and drum. Then she asked the children to hold up their paper instrument when they heard the sound of each instrument.

CHAPTER III

METHODS AND PROCEDURES

Subjects

The subjects of the study were from the three kindergarten classes in the Bolivar, Missouri, public school system. The class enrollment at the beginning of the study was 31, 34, and 35. This enrollment represented the total kindergarten population of the Bolivar School District. Bolivar is a small town with a population of 4,500. The town is an agriculture trading center with a few industries and a small college. Many of the town's residents commute to jobs in Springfield, Missouri. The population, in general, could be classified as Middle- and low-income families.

Students were statistically eliminated from the study because of one or more of the following reasons: (1) those who had a history of ear infections, as determined by parent or teacher report; (2) children who had a medical diagnosis of a hearing disorder; (3) those who had obvious symptoms of a cold and cough; (4) students who had Y scores on the 1st Wepman Auditory Discrimination Test, indicating an invalid test; (5) children who had missed a

week or more of school; and (6) those who would not be available to take the complete battery of pretests.

Treatment and Treatment Groups

Grouping and Matching Procedures

The students were divided into three treatment groups within each classroom. The Wepman pretest scores provided the basis for grouping. The Wepman Test for Auditory Discrimination was chosen for grouping because (1) the Wepman Test is recognized and accepted as a standardized test, and (2) the difference or sameness in speech sound is crucial in understanding language and in learning to read (52).

The difference in maturation between boys and girls at the kindergarten level was the primary reason that sexes were considered separately (1). In the analysis of covariance, sex was nested to meet the criterion of randomization and to compare treatment effects with and without sex. The average chronological age for boys and girls by groups can be found in the Appendix (p. 139).

Since the assumption of randomization was not clear cut, in that male and female factors could not be completely randomized, boys and girls were separated statistically. To obtain matching triplicates, the boys were placed in rank order according to their scores on the Wepman Auditory Discrimination Test. The top three scores made up

triplicate one, the next three scores went into triplicate two, etc. The matching of subjects did not have to be extremely close in terms of auditory discrimination levels, because auditory discrimination scores were used as a covariate. Following the matching procedures, each boy within each triplicate was assigned at random to one of the groups. Thus, in each group there was one boy from the top three auditory discrimination scores, one boy from the second three highest scores, and so on up to the potential number of triplicates. The procedure for obtaining matched triplicates of girls was the same, and each girl was assigned at random to one of the groups. In each of the three kindergarten classes there was a triplicate N size of 11 in each sex. Those boys and girls not assigned to triplicates continued through the mechanics of the study and were assigned to one of the groups.

Programs for Treatment Groups

The treatment groups were identified as follows: (1) Experimental I, who would have physical education experiences designed to improve auditory discrimination; (2) Experimental II, who would have classroom experiences designed to improve auditory discrimination; and (3) Control Group, who would have the usual classroom work without prescribed treatments.

The activity content for Experimental Group I was gross motor movement, both locomotor and axial, as

determined by movement exploration, rhythms, games, and mimetics. The time spent by the children in each of the above activities was approximately equal for all activities except mimetics. Mimetics was used for part of a lesson three times. An example of each of the above types of activities follows:

1. Movement exploration--With normal intensity the teacher said the sound of consonants, M L S F K T. The children responded by using part of their body to form the letters as they heard them. They began by responding with their hands and fingers and progressed toward use of their whole body.

2. Rhythms--The teacher played varied rhythms on a drum, both soft and loud intensity. The children responded by walking, hopping, or skipping to rhythm; they moved quietly when the drum beat was soft, and vigorously when the drum beat was loud.

3. Games--The children played a game called "Crows and Cranes." The class was divided into two groups (two lines), standing about two feet apart. One line was named crows and the other line cranes. If the teacher said crows, the cranes chased the crows to a safe line and vice versa. The teacher varied the words the groups responded to, cat-rat, ball-call, train-rain, bow-wow, moo-coo.

4. Mimetics--The children played a game called "Shipwreck." The children listened to verbal clues and

moved to various designated positions, where they mimeticed shipboard activities; i.e., port, ran to the left side; starboard, ran to the right side; man the lifeboats, sat down and rowed; man overboard, pretended to swim.

The problem-solving method was used in teaching the activities. In the Experimental I group the objective of the lesson was for the child to make a movement response to show that he could discriminate sounds. The objective was not a correct skill pattern response, but rather a free, generalized movement response. For instance, the response might have been one that involved running. In those lessons how the child ran was not paramount--only the fact that he ran. The lesson plans for the Experimental Group are presented in the Appendix (p. 71).

Experimental Group II received auditory training with the same kind of progression as Experimental Group I. The response to auditory stimuli was in terms of classroom work without physical education-type activities. The classroom response was made by coloring, raising hands, clapping, giving verbal answers, pointing, and writing.

The following are examples of some of the types of responses obtained from the classroom group:

1. Verbal--As the teacher played even and uneven rhythms on the drum and wood blocks, the children responded by saying whether the rhythm was even or uneven.

2. Hand raising--As the teacher said words or names of students using one, two, or three syllables, the students responded by holding up one, two, or three fingers to match the number of syllables in the word.

3. Writing--The teacher played even and uneven rhythms on the drum. The children drew a bumpy line if the rhythm was uneven and a smooth line if the rhythm was even.

4. Drawing--The children played a game called "Shipwreck." The children listened to verbal clues and marked the appropriate position on a picture of a ship or drew a picture of action; i.e., port, marked an X on the left side of the ship; man overboard, drew a picture of a swimmer. The teacher placed examples on the board and had a practice session first.

The lessons for Experimental Group II had the same objectives as those for Experimental Group I. The difference was in the type of response expected from auditory stimuli. The reason for using the second experimental group was to enable the researcher to ascertain if the gross motor responses of Group I provided a better method of auditory education than the fine motor responses that are typically used in classroom auditory lessons. The problem-solving method was used in teaching the classroom lessons. The lesson plans for Experimental Group II are presented in the Appendix (p. 71).

The same teacher taught Experimental Group I and Experimental Group II. One of the three classroom teachers had charge of the Control Group. Responsibility for the Control Group was delegated on a rotating basis.

Children in the Control Group did not receive any specific auditory training, nor did they have any planned activity other than regular play periods. In order to equate the time schedule, and perhaps minimize the "halo" effect, the Control Group had art, dramatic lessons, or an extra recess.

Testing Procedures

Pretests

The Wepman Auditory Discrimination Test was administered first. Since the researcher's speech accent was not of local origin, an individual who did have good diction of that locality made a tape of both forms of the Wepman Test. Taping was done on a high quality tape recorder; the words were said in accordance to test instructions. The test was individually administered, with enough examples of test items to assure the examiner that the testee understood the directions.

Subjects were given the Metropolitan Readiness Test by their respective classroom teachers. The Test of Non-Verbal Auditory Discrimination was given by the researcher. The test was on tape, and a high quality

tape recorder was used in administering the test. Following the test author's suggestion, the test was given to 10 pupils at a time. Ample time was taken to assure the administrator that the testees understood the taped instructions. Seating arrangement was in a circle, with the tape recorder in the center. Chairs were spaced to discourage copying.

Post-tests

During the last four days of school the subjects were given the following tests: the Birch-Belmont Test for Auditory Integration, an alternate form of the Wepman Test for Auditory Discrimination, the Test for Non-Verbal Auditory Discrimination, and an alternate form of the Metropolitan Readiness Test. The tests were administered in the same manner as the pretest.

The Birch-Belmont Test for Auditory Integration was given by the researcher, with the aid of the experimental group teacher. The test was given to one class at a time, with seating and test booklets arranged to discourage copying. The Wepman Test was given individually, using a different form than the pretest. The TENVAD Test was given to 10 subjects at a time. There is only one form of the TENVAD Test, but the author, Dr. Butkenica, stated that there is no memory factor involved and the same form is reliable on post-test. The Metropolitan Readiness Tests were given by the classroom teachers, using an alternate

form. The last day was used as a make-up period for all tests.

Statistical Procedures

The statistical analysis of data consisted of three parts. (1) Pearson Product-Movement correlations were run on the Wepman Test for Auditory Discrimination, the Test for Non-Verbal Discrimination (TENVAD), and the Metropolitan Readiness Test. (2) Data from a nested factorial design consisting of the Wepman, Metropolitan, TENVAD, and TENVAD Subtest (Rhythm) were analyzed using an analysis of covariance in order to investigate average change between Experimental I and Control, Experimental II and Control, and Experimental I and Experimental II. The significant level was set at .05. (3) Subjective evaluation was obtained from the classroom teachers. The Birch-Belmont Test for Auditory Integration was administered during the post-test period.* The mean and standard deviations were computed.

A subjective evaluation was obtained in the following manner: (1) Each classroom teacher was asked to give her opinion regarding any changes in the behavior of her students; and (2) The experimental group teacher was asked to note any problem that arose in the presentation of the

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*Due to transportation strikes the Birch-Belmont Test did not arrive in time for the pretest period.

lessons. For example, the progression that two groups experienced should have been at the same rate and any variances were noted and reported to the researcher.

Facilities

North Ward school building, where the study was conducted, consisted of three kindergarten classes on the second floor. The Experimental Group I teaching station was on the side and back area of the playground. There was no permanent play equipment in this area, and the teaching station was separated from the main playground by approximately 50 yards. A basement area called the "music room" was used during inclement weather and for lessons that required a record player. Since the inside area of the room was not large enough for all the group to move freely, when this room was used the class was divided into halves or thirds and they took turns responding to auditory stimuli.

Experimental Group II met in one of the regular classrooms.

Duration

The duration of the study was for 27 lessons over a six-week period. Each lesson was approximately 30 minutes in length. The time schedule conformed with existing school schedules. The schedule was as follows: 9:30-10:00--Experimental I had physical education with

Experimental I treatment, Experimental II had recess, and the Control group had recess; 10:10-10:40--Experimental I had recess, Experimental II had Experimental II treatment, and the Control Group had art, dramatics, or recess. A visual presentation of the time schedule for the kindergarten classes is shown in Table 1.

TABLE 1.--Time schedule for kindergarten classes.

	Experimental I	Experimental II	Control
Before school	Free Play	Free Play	Free Play
9:15- 9:25	Classroom	Classroom	Classroom
9:30-10:00	Auditory training in physical education	Recess	Recess
10:00-10:40	Recess	Auditory training in the classroom	Art or dramatics lessons in the classroom or recess

CHAPTER IV

ANALYSIS OF DATA

The results obtained from the statistical analysis of data will be presented under the two main hypotheses.

Hypothesis 1

Auditory discrimination ability test scores are correlated at the kindergarten age level:

1.1 Verbal and nonverbal auditory discrimination test scores are correlated with one another at this age level.

1.2 Verbal and nonverbal auditory discrimination test scores are correlated with readiness at this age level.

1.3 Verbal and nonverbal auditory discrimination and readiness test scores will show varying degrees of correlation, depending upon the sex of the child.

Pearson product moment correlations were run on the post-test scores on the Wepman Test for auditory verbal discrimination ability, the TENVAD Test for auditory nonverbal discrimination ability, and the Metropolitan Readiness Test for readiness for reading. The correlation results are presented in Table 2.

In general, the correlation results obtained for girls appear to be slightly higher than the correlation results for boys.

TABLE 2.--Intercorrelation results of post-test scores.

Post-Test Scores	Boys N=33	Girls N=33
Wepman/TENVAD	.36	.50
Wepman/Metropolitan	.30	.61
TENVAD/Metropolitan	.48	.46

The results indicate that although the intercorrelations were low for Wepman and the TENVAD, the correlations are in general agreement with results obtained by Buktenica (r=.40) (6, p.11). Buktenica's data were not separated by sex. In the present study girls and boys were separated for analysis.

The subjects in Buktenica's study were 1st grade students (6-7 years of age). From examination of Table 3, it is readily apparent that at the kindergarten level, only 41 per cent of all children (28 out of N of 66) received the expected scores standardized for 1st grade children. Sixteen of the kindergarten girls had reached or exceeded the expected raw score of 33 for age 6 (6, p. 11). Twelve of the kindergarten boys had reached or exceeded the expected raw score of 33 (6, p. 11) (see Table 3). From this comparison, it would appear that additional normative data are necessary for standardizing this test for children at the kindergarten level.

TABLE 3.--Comparison of TENVAD expected raw scores in this study.

	Buktenica	Expected Raw Scores	
N = 495 6 year	Rhythm 6	Total Score 33	Reliability .75*

Bolivar, Missouri, Scores

Group**	Sex	N scoring 6 or 6+		N scoring 33 or 33+	
		Pre-test	Post-test	Pre-test	Post-test
Exp. I	B	4	8	3	4
Exp. I	G	7	8	2	4
Exp. II	B	6	7	5	3
Exp. II	G	8	9	4	7
Control	B	8	5	2	5
Control	G	3	7	2	5
Totals		34	45	20	28

*Ref. 6, p. 11.

**N = 11
Total N = 66

Based on these correlation results, Hypothesis 1 of this study was accepted:

1. Auditory discrimination, verbal and nonverbal, and readiness are correlated with one another at the kindergarten age level, although the correlations found were low.
2. Auditory discrimination, verbal and nonverbal, and readiness show varying degrees of correlation, depending upon the sex of the child, with girls slightly higher than boys.

Further studies need to be done to gather normative data by sex at the kindergarten level for standardizing the TENVAD Test. In addition, administrative procedures for this age level need to be re-examined, especially relevant to the administration of the test to 10 kindergarten students at a time.

Hypothesis 2

Significant differences will result in auditory discrimination test scores, verbal and nonverbal, and readiness of children who undergo auditory discrimination training programs at the kindergarten age level:

2.1 Treatment effects will favor those children undergoing a specially designed physical education program, compared to a specially designed classroom program.

2.2 Treatment effects will vary with sex.

Data from a nested factorial design consisting of the Wepman, Metropolitan, TENVAD, and TENVAD Sub-test (Rhythm) were analyzed using an analysis of covariance. The analysis used paired subjects from high to low pre-test scores as an additional block against error. The significant level was .05.

Auditory Verbal Discrimination

The covariance results for auditory verbal discrimination, as assessed by the Wepman Test, are presented in Tables 4, 5, and 6 by treatment groups. No significant differences were found in auditory verbal discrimination ability between treatment groups, sex, and interaction between sex and treatment. Based on these results the null hypothesis is accepted:

2. H_o: There is no difference between Experimental Treatment Groups and the Control Group.

2.1 H_o: There is no difference between Experimental Group I and Experimental Group II.

2.2 H_o: There is no difference between sexes and treatment.

Auditory Nonverbal Discrimination

The covariance results for auditory nonverbal discrimination, as assessed by the TENVAD Test, are presented in Tables 7, 8, 9, and 10 by treatment groups. No significant differences were found in nonverbal auditory discrimination

TABLE 4.--Wepman Auditory Discrimination Test, analysis of covariance: Experimental I vs Control.

Source	df	SS Adjusted	MS Adjusted	F Ratio
Sex (A)	1	6.23	6.23	.49
Pairs w/n sex	19	239.13	12.59	
Treatments (B)	1	.79	.79	.07
A x B	1	15.20	15.20	1.51
Pairs w/n Sex x B	19	191.65	10.09	

TABLE 5.--Wepman Auditory Discrimination Test, analysis of covariance: Experimental II vs Control.

Source	df	SS Adjusted	MS Adjusted	F Ratio
Sex (A)	1	3.47	3.47	.23
Pairs w/n Sex	19	286.45	15.08	
Treatments (B)	1	8.25	8.25	1.58
A x B	1	13.94	13.94	2.67
Pairs w/n Sex x B	19	99.15	5.22	

TABLE 6.--Wepman Auditory Discrimination Test, analysis of covariance: Experimental I vs Experimental II.

Source	df	SS Adjusted	MS Adjusted	F Ratio
Sex (A)	1	5.27	5.27	.38
Pairs w/n Sex	19	260.25	13.70	
Treatments (B)	1	1.29	1.29	.12
A x B	1	.97	.97	.09
Pairs w/n Sex x B	19	205.09	10.79	

TABLE 7.--Adjusted means within treatment groups by sex.

Test	Experimental I		Experimental II		Control	
	Boys	Girls	Boys	Girls	Boys	Girls
TENVAD	31.15	31.72	29.84	29.46	30.15	32.09
TENVAD Rhythm sub-tests	7.09	5.97	6.29	6.93	4.80	6.62

TABLE 8.--TENVAD, analysis of covariance: Experimental I vs Control.

Source	df	SS Adjusted	MS Adjusted	F Ratio
Sex (A)	1	.61	.61	.01
Pairs w/n Sex	19	1276.20	67.17	.01
Treatments (B)	1	.45	.45	
A x B	1	8.74	8.74	.26
Pairs w/n Sex x B	19	478.81	33.47	

TABLE 9.--TENVAD, analysis of covariance: Experimental II vs Control.

Source	df	SS Adjusted	MS Adjusted	F Ratio
Sex (A)	1	396.43	396.43	19.39*
Pairs w/n Sex	19	388.34	20.44	
Treatments (B)	1	381.83	381.83	4.71*
A x B	1	381.93	381.93	4.72*
Pairs w/n Sex x B	19	15.32	.81	

*Significant at .05 level.

TABLE 10.--TENVAD, analysis of covariance: Experimental I vs Experimental II.

Source	df	SS Adjusted	MS Adjusted	F Ratio
Sex (A)	1	1.45	1.45	.0516
Pairs w/n Sex	19	532.96	28.05	
Treatments (B)	1	.38	.38	.02
A x B	1	27.71	27.71	.01
Pairs w/n Sex x B	19	207.82	21.46	

ability between the two Experimental Treatment Groups, or between Experimental Treatment Group I and Control Treatment Group, in treatment, sex, or interaction between sexes and treatment. Significant differences were found between Experimental Treatment Group II and Control Treatment Group in treatment, sex, and interaction between sexes and treatment. Examination of the adjusted means in Table 7 showed that the treatment effects favored the Control Classroom Treatment Group over the Experimental Classroom Treatment Group II. Further examination of the adjusted means in Table 7 indicated little or no difference between Experimental Physical Education Group I and Control Classroom Group or between Experimental Physical Education Group I and Experimental Classroom Group II. Based on these results the following findings appear justified:

The null hypothesis is rejected for

2. H_o: There is no difference between Experimental Treatment Groups and the Control Group.

2.2 H_o: There is no difference between sexes and treatment.

The null hypothesis is accepted for

2.1 H_o: There is no difference between Experimental Group I and Experimental Group II.

The Rhythm Sub-test was analyzed because pretest scores were not available for the Birch-Belmont Auditory Integration Test. The Birch-Belmont Test measured nonverbal

auditory discrimination ability to hear rhythm patterns and recognize the patterns visually (.–.——). The TENVAD Sub-test, Rhythm, measured the nonverbal auditory discrimination ability to hear differences and sameness in rhythm patterns.

No significant differences were found in auditory nonverbal rhythm discrimination ability between the Experimental Treatment Groups and the Control Treatment Group and between the two Experimental Treatment Groups in treatment and interaction between sexes and treatment. Significant difference was found between all Treatment Groups in sex. Examination of the adjusted means scores for the TENVAD Sub-test, Rhythm, in Table 7 indicated sex differences between all groups for boys and girls. The differences in adjusted means were most varied for girls. The greater change may have occurred in nonverbal auditory discrimination of rhythm of boys in the Control Group. Based on these results the following findings appear justified:

Acceptance of the null hypothesis:

2. H_o: There is no difference between Experimental Treatment Groups and the Control Group.

2.1 H_o: There is no difference between Experimental Group I and Experimental Group II.

Rejection of the null hypothesis:

2.2 H_o: There is no difference between sexes and treatment.

TABLE 11.--TENVAD Sub-test Rhythm, analysis of covariance: Experimental I vs Control.

Source	df	SS Adjusted	MS Adjusted	F Ratio
Sex (A)	1	5.36	5.36	7.05*
Pairs w/n Sex	19	14.53	.76	
Treatments (B)	1	3.96	3.96	.25
A x B	1	4.92	4.92	.30
Pairs w/n Sex x B	19	310.71	16.35	

*Significant at .05 level.

TABLE 12.--TENVAD Sub-test Rhythm, analysis of covariance: Experimental II vs Control.

Source	df	SS Adjusted	MS Adjusted	F Ratio
Sex (A)	1	67.68	67.68	16.23*
Pairs w/n Sex	19	79.25	4.17	
Treatments (B)	1	9.71	9.71	3.93
A x B	1	.49	.49	.20
Pairs w/n Sex x B	19	46.89	2.47	

*Significant at .05 level.

TABLE 13.--TENVAD Sub-test Rhythm, analysis of covariance: Experimental I vs Experimental II.

Source	df	SS Adjusted	MS Adjusted	F Ratio
Sex (A)	1	.88	.88	5.09*
Pairs w/n Sex	19	32.80	1.73	
Treatments (B)	1	4.31	4.31	1.46
A x B	1	4.84	4.84	1.64
Pairs w/n Sex x B	19	56.17	2.96	

*Significant at .05 level.

Readiness

The covariance results for readiness for reading, as assessed by the Metropolitan Readiness Test, are presented in Tables 14, 15, and 16 by treatment groups. No significant differences were found in readiness for reading ability between treatment groups in sex, treatment and interaction between sexes and treatment. Based on these results the following findings appear justified:

Acceptance of the null hypothesis:

2. H_o: There is no difference between Experimental Treatment Groups and the Control Group.

2.1 H_o: There is no difference between Experimental Group I and Experimental Group II.

2.2 H_o: There is no difference between sexes and treatment.

Subjective Evaluation

The three kindergarten classroom teachers had taught their respective classes for nine months, from 9:00 a.m. until 3:00 p.m. daily, including a closed lunch period. Their knowledge of student behavior qualified them as experts in observation of their particular classes. The following evaluation merits consideration from the standpoint of teacher judgment:

Auditory Verbal Discrimination Changes

All three regular classroom teachers were of the opinion that both experimental groups improved in attentiveness

TABLE 14.--Metropolitan Readiness, analysis of covariance: Experimental I vs Control.

Source	df	SS Adjusted	MS Adjusted	F Ratio
Sex (A)	1	11.56	11.56	.92
Pairs w/n Sex	19	235.97	12.52	
Treatments (B)	1	57.33	57.33	.99
A x B	1	72.36	72.36	1.25
Pairs w/n Sex x B	19	1096.35	57.70	

TABLE 15.--Metropolitan Readiness, analysis of covariance: Experimental II vs Control.

Source	df	SS Adjusted	MS Adjusted	F Ratio
Sex (A)	1	10.08	10.08	.29
Pairs w/n Sex	19	770.91	40.54	
Treatments (B)	1	14.95	14.95	.33
A x B	1	29.28	29.28	.65
Pairs w/n Sex x B	19	851.21	44.80	

TABLE 16.--Metropolitan Readiness, analysis of covariance: Experimental I vs Experimental II.

Source	df	SS Adjusted	MS Adjusted	F Ratio
Sex (A)	1	4.76	4.76	.13
Pairs w/n Sex	19	676.57	35.61	
Treatments (B)	1	20.53	20.53	.42
A x B	1	3.66	3.66	.07
Pairs w/n Sex x B	19	940.46	49.50	

and listening skills in class. The listening skills involved listening to stories read and told by the teacher, phonetic drills, and verbal instructions. One teacher judged the Experimental II Group as the most improved. One teacher judged that the boys in the Experimental I Group made the most improvement in listening. Two teachers believed the poorer students improved noticeably in listening skills.

Based on the classroom teachers' subjective evaluations of the treatment groups regarding changes in auditory behavior, the following statements appear justified:

1. Poorer listeners appear to improve in listening skills as assessed in this study more than better listeners.
2. Boys appear to improve more than girls in the listening skills assessed in this study.

The auditory change that would be most noticeable to the classroom teacher is the verbal auditory discrimination ability. The above results are the opposite of those results obtained in the statistical analysis of the Wepman Test, used for the assessment of verbal auditory discrimination. The implications of these findings will be discussed in Chapter V.

Progression and Effect of Methods

The teacher of the experimental groups and the researcher concurred in the opinion that the Experimental

Group I progress was slower than anticipated during the first five lessons. This slowness was thought to be due to the fact that the group had not had an organized physical education class before this time. The kindergarten children were from well-disciplined and regimented behavioral oriented classrooms. Any one of the aforementioned factors may have contributed to the difficulty of obtaining freedom in the movement response to a problem-solving teaching style. Once this learning block was overcome, the Experimental Group I began to show progress in the auditory training sequence, at a rate similar to the classroom groups.

When the Experimental Group in physical education had the lessons presented in the "music room," the auditory stimuli seemed to elicit a more total improvement of the students in participation. This may have been due to a number of factors, such as: (a) the distraction caused by the outdoor environment, (b) the greater interest of the children in the rhythmic activity, and (c) the willingness to participate in a structured, organized activity involving musical stimuli rather than movement *per se* through other auditory stimuli.

The subjective evaluation of the teacher for both experimental groups reflected one of the greatest limitations of this study. Kindergarten children require a period of time to learn to respond to a problem-solving teaching style. A longer period of time appears to be needed to

acquire these learnings in a physical education program. The implication of these results will be discussed in Chapter V.

Birch-Belmont Test for Auditory Integration

The means of the boys and girls' scores obtained in this study (N=11 girls; N=9 boys) with the mean obtained by Birch-Belmont in their original study (4), which included both sexes (N=130) are presented in Table 17.

TABLE 17.--Comparison of the means of the Birch-Belmont Tests.

Experimental I		Experimental II		Control		Birch-Belmont Mean
Boys	Girls	Boys	Girls	Boys	Girls	Boys and Girls
3.9	4.8	5.3	3.5	4.6	3.9	4.1

The above results indicated that the mean scores in this study were within the range of the mean scores in the original study.

The implications of the results of the Birch-Belmont Test and the recommendation for future studies using this test will be presented in Chapter V.

CHAPTER V

SUMMARY AND CONCLUSIONS

The primary purpose of this study was to investigate the effects of a planned physical education program on auditory discrimination ability, verbal and nonverbal, of young children at the kindergarten level. Two subpurposes were: (1) to design a sequential auditory discrimination training program for the physical education and for the classroom learning experiences at the kindergarten grade level, and (2) to examine the relationship between verbal and nonverbal auditory discrimination ability, reading readiness, and sex.

The Wepman Auditory Discrimination Test for verbal assessment, the TENVAD Test for assessment of nonverbal auditory discrimination, and the Metropolitan Readiness Test were administered to 66 children enrolled in three kindergarten classes in the Bolivar, Missouri, public school system. Post-tests, alternate versions of the Wepman and Metropolitan, and the same version of the TENVAD were administered six weeks later. Students were assigned at random to one of the treatment groups: Experimental Treatment Group I (physical education class designed to

improve auditory discrimination ability), Experimental Treatment Group II (classroom procedures designed to improve auditory discrimination ability), and the Control Treatment Group (regular classroom procedures with recess). Randomization was accomplished using the following procedure: Children were grouped on Wepman Test results in rank order; triplicates were obtained by selection of the top three scores for boys, which became triplicate one, the next highest three scores became triplicate two, etc. Following the matching procedures, each boy within the triplicates was assigned at random to one of the three treatment groups (Experimental Treatment Group I, Experimental Treatment Group II, or the Control Treatment Group. The same procedure was used for the girls.

The data were analyzed using the following statistical procedures: (1) correlations were run using the post-test scores on the Wepman, TENVAD, and Metropolitan Readiness Tests for boys (N=33) and for girls (N=33), and (2) covariance in a nested factorial design of the Wepman, TENVAD, and TENVAD sub-test titled Rhythm was used to investigate average change between the three groups and the effects of sex. Each of the Experimental Treatment Groups and the Control Treatment Group had an N of 22 (N=11 boys and N=11 girls).

Findings

The findings of this investigation, presented within the context of the limitations imposed by the design of the study and instruments used to assess auditory discrimination ability, were:

1. Auditory discrimination ability, both verbal and non-verbal, is related to reading readiness at this age: with verbal ability having the highest relationship with readiness; with girls having higher relationship on all variables compared to boys. In general, the correlations were low but all the correlations fall within the range reported by other studies.

2. Significant differences found for the nonverbal auditory discrimination ability (TENVAD) were between the experimental classroom program designed for auditory discrimination training and the control classroom for treatment, sex, and interaction between sexes. The children in the controlled classroom appeared to show greater change in auditory discrimination ability, with girls showing greater change than boys (based on examination of the adjusted mean scores).

3. Significant differences for sex were found among the Experimental Treatment Groups and the Control Treatment Group for Rhythm (TENVAD Sub-test). The differences for boys appeared to indicate greater change from undergoing the experimental physical education program and least

change in the controlled classroom. The girls' results showed no consistent pattern of change.

4. From the results of the teachers' subjective evaluations of the changes occurring in the children's listening skills, as assessed in this study, the lesson progression for auditory discrimination training, and methodology or teaching style employed in presenting each lesson, the following findings appear justified:

   a. Poorer listeners appear to improve in listening skills as assessed in this study more than better listeners.

   b. Boys appear to improve more than girls in the listening skills assessed in this study.

5. Kindergarten children were capable of understanding and responding to the test items in the Wepman and the TENVAD Tests. The TENVAD standard tests do not appear appropriate for kindergarten children, nor are the group testing procedures feasible with this age level. The Birch-Belmont Test of Auditory Integration needs to be refined with respect to number of items, complexity of items, and mechanics of the test before it is feasible to use in assessment of auditory integration ability of kindergarten children.

6. The sequential program for kindergarten children in auditory discrimination ability designed for the classroom and for the physical education program was viable.

The one factor affecting the viability of the program was motivation; i.e. the intensity of the program, in a six-week period did not allow the children opportunities to attend to and respond to other types of stimuli in their learning experiences.

Implications for Programming and Teaching

There are two major implications of this investigation for structuring and teaching auditory training experiences in physical education and in the classroom for children in the primary grades K, 1, 2, 3.

First, it is recommended that the progression for auditory discrimination ability structured for physical education and the classroom should be designed as a teacher evaluation technique for assessing the entry status of each child. Based on this assessment, the teacher would plan a learning prescription for the individual child, i.e. to remediate through an intensive training program, if considered essential at this time, and/or to implement in all the learning experiences which the individual child is undertaking at this time to aid in getting the child ready to move forward in his development.

It is recognized that not all children need to have special remediation procedures (intensive training) in auditory discrimination. However, if one considers this ability necessary, in language development, it seems

reasonable to assume that auditory discrimination would become an integral part of the teaching presentation and incorporated in all children's learning experiences.

Second, it is recommended that sequential auditory discrimination developmental learning tasks be considered a part of all teaching; i.e. the planning and implementing of all the learning experiences for all the children, particularly in early childhood and the primary grades "Perception will always be served by good and appropriate teaching of the perceiver" (33, p. 38). The problem is one of determining what is "good" and what is "appropriate."

The sequential program of auditory discrimination tasks and learning prescription (what activities) for each level to lead the child forward toward next tasks that was used in this study for the classroom and for physical education is recommended as the base for selecting and developing other activities for each sequential task.

Implications for Further Research

Areas and variables for further research suggested by the findings of the study include the following topics:

1. The design of the study could be replicated with a larger sample and the study conducted over a longer period of time (a minimum of a semester) teaching style in all the auditory training experiences could be incorporated in the regular program a period of time before the program

is introduced (6-8 weeks) for children to adjust and readily respond. A physical education program could be implemented for a period of time (6-8 weeks) before the study, which would provide time for the adjustment of the children to program activities rather than "recess" per se.

2. The sex differences of this study suggest that investigation of the interrelationships between maturation (skeletal X-ray assessment), auditory discrimination ability, and readiness should be undertaken. Furthermore, the differences found suggest that investigation should be made of the interrelationships between maturation, nonverbal auditory discrimination, readiness, children's learning styles (aural, visual, or physical), and sex.

3. Specifications for the administration procedures of the TENVAD and the Birch-Belmont Tests with kindergarten children need further investigation. Data need to be gathered for standardization of these tests with particular reference to possible sex differences in the construction of "norms." Further studies need to be conducted on all the TENVAD sub-tests, with particular reference to the weighting given the Rhythm sub-test.

4. Measurement technique in gross movement rhythmical analysis needs to constructed and the interrelationship to nonverbal auditory discrimination ability needs to be investigated.

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APPENDICES

APPENDIX A

LESSONS

Experimental I

Lesson 1

Objectives:

1. For the students to be able to localize pure sound (1, 2).
2. For the students to respond to pure tone, simple rhythm (2, 3, 5ab).

Equipment: Drum, rattle, bells, shaker, and tonette.

Activity:

1. Students were organized as to the procedure of getting to and from the outdoor area. Boundary lines were established for the play area.
2. The teacher used two sounds to allow for comparison of space distance. The students closed their eyes and turned their body toward the sound.
3. The teacher took a position in back of students and made various instrumental sounds. The students with their eyes opened walked backward toward the sound.
4. The children were asked to respond to fast and slow drum beats by clapping, walking, jumping, and hopping. The class was divided in half; one group clapped while the other group responded by movement to rhythm.

Experimental I

Lesson 2

Objectives:

1. For the students to review localization of sound in space (1, 2, 13).
2. For the students to respond to pure tone simple rhythm (2, 3, 5ab).
3. For the students to respond to simple rhythm with various intensity (3, 5 c).

Equipment: Blindfolds, cymbals, drum, rattle, whistle and triangle.

Activity:

1. The children were asked to respond to simple even rhythm by walking in a circle around teacher.
2. The children were asked to respond to even rhythm of varying intensity by walking, jumping, running, and hopping.
3. Six children were blindfolded and six other children were given noisemakers. Those with noisemakers moved in a circle. All others in the circle clapped. The six blindfolded children had to find a noisemaker from those in the circle.

Experimental I

Lesson 3

Objectives:

1. For the students to respond to intensity variations of pure tone (3, 5).
2. For the students to respond to one instrument with varying rhythm (3, 5, 9).
3. For the students to respond to soft and loud sounds of different intensity at different rhythms (3, 5, 9, 11).

Equipment: Drum, six blindfolds

Activity:

1. The teacher was in center of circle with drum. The children responded by fast movement when the sound was loud and slow movement when sound was soft; when sound stopped they were asked to stop all motion (freeze).
2. The children were asked to respond to even and uneven rhythm first by clapping and then by a locomotor movement. Even rhythm was emphasized.
3. The children played "hot or cold" by using loud sound when six blindfolded players were hot, (near object) and soft sound when players were cold, (far from the object).

Experimental I

Lesson 4

Objectives:

1. For the students to respond to consonant and vowel sounds (4, 6, 7a).
2. For the students to respond to consonant and vowel sounds of varying intensity (4, 6, 7a, 11).
3. For the students to respond to different tempo of nonverbal sound (3, 5, 9).

Equipment: Record and record player

Activity:

1. With normal intensity the teacher said the sound of the consonants, M L S F K T. The children responded by using part of their body to form the letters as they heard them. They began by using only the hands and fingers and then progressed toward use of whole body.
2. In a softer tone the teacher said the sound of the letters o, w, d, b, and asked the child to respond in the same manner as above.
3. The teacher introduced the record "Clock Song" and the children moved in rhythm to the different clocks. Three groups were used and each group was assigned a clock.

Experimental I

Lesson 4.--Continued.

Each group moved in the rhythm of their assigned clock when that sound was heard on the record.

Experimental I

Lesson 5

Objectives:

1. For the students to review localization of sound in space (1, 2).
2. For the students to respond to vowel sounds (4).
3. For the students to respond to different rhythm and varying intensity of sound (3, 5, 9, 11).

Equipment: Tonette, drum, whistle, cymbals

Activity:

1. The teacher while moving made sounds with various noisemakers in back of the students. The students moved left, right, up, and back as the sound moved.
2. The teacher said the vowels $\bar{o}$ and $\bar{u}$ and the students formed the letters with hands and fingers, traced them in the air. Then, they responded by using the whole body to form the letter.
3. The teacher used the drum to beat loud and soft, fast and slow sounds in various combinations. The children responded to the sounds with movement of the body in this sequence: head, arms, trunk, legs, and whole body.

Experimental I

Lesson 6

Objectives:

1. For the students to respond to one instrument sound over distracting noise (3, 5, 13).
2. For the students to respond to vowel sounds (4, 5a).
3. For the students to respond to tempo and intensity variations of pure tone (3, 5, 9, 11).

Equipment: Tonette, drum and whistle

Activity:

1. The teacher played various rhythms with a drum and children responded by walking, running, and skipping. The teacher played the drum, while some children used noise-makers and others clapped their hands to provide distracting noises. The children responded to the drum beat with locomotor motion.
2. The teacher reviewed sounds of $\bar{o}$ and $\bar{u}$ and then added $\bar{i}$ and $\bar{a}$ sounds. The children responded first by air writing and then by making body designs of the letter sounded.
3. The teacher played the drum fast and slow with loud and soft variations. The children responded with locomotor movements.

Experimental I

Lesson 7

Objectives:

1. For the students to respond to vowel sounds (4, 5a).
2. For the students to respond to consonant sounds (6, 7a).
3. For the students to respond to different beginning consonant sounds (7, 12).

Equipment: None

Activity:

1. Students reviewed forming the shape of vowels. The teacher used the vowels o, a, u, i, e. The children responded to sounds by using two arms, and then two legs; at both sitting and lying levels.
2. The shapes of consonants b, p, m, w, h were reviewed in the same manner as stated in number 1.
3. The game "crows and cranes" was introduced. The class was divided into two groups (two lines). They stood about two feet apart; one line was named the crows and the other line the cranes. When the teacher said crows, the cranes chased the crows to a base line and vice versa. The teacher varied the words used; cat-rat, ball-call, train-rain, bow-wow, moo-coo.

Experimental I

Lesson 8

Objectives:

1. For the students to review response to consonant sounds and vowel sounds (6, 7a).
2. For the students to respond to one instrument sound over multi-instrument sound (3, 5, 13).
3. For the students to respond to differences in intensity of sound (5, 11).

Equipment: Record player and Herb Alpert record, drum

Activity:

1. The teacher said the sound of a letter of the alaphabet and asked children to respond by making letters with some part of their body. The children worked with partners.
2. As the record played the teacher identified the horn, banjo and drum. The teacher asked the children to move when the horn, the banjo and the drum were playing. They were instructed to stop moving when they could not hear any of the three instruments.
3. The teacher beat the drum softly and loudly and asked the children to respond by softly walking, jumping, or running when the sound was soft. The children were asked to respond by moving loudly when sound was loud.

Experimental I

Lesson 9

Objectives:

1. For the students to respond by echo and movement to animal noises (6, 7, 8).
2. For the students to respond to loud and soft sounds in a rhythm variation (5, 11).
3. For the students to respond to high and low tones (3, 10).

Equipment: Drum and piano.

Activity:

1. As the teacher made animal sounds class would echo those sounds and move in the manner they thought that animal moved (moo, baa, hee-haw, oink, cluck, quack, gobble).
2. The teacher played varied rhythms on a drum in soft and loud intensity. The children responded by walking, hopping, or skipping to rhythm and moving quietly when soft, and vigorously when loud.
3. The game "Over and Under" was introduced. The teacher gave the clue of a high note for over and a low note for under. The children obtained partners and one partner went over or under his kneeling partner according to clues given by the teacher.

Experimental I

Lesson 10

Objectives:

1. For the students to respond to different consonant endings (7, 12).
2. For the students to respond to high and low tones (3, 10).
3. For the students to respond to even and uneven rhythm (3, 5).

Equipment: Tonette, drum, and line markers

Activity:

1. The children played "Crows and Cranes" and responded to word endings (i.e. Cap-cab, cat-calf).
2. The game "I am very tall or small" was introduced. A high note on tonette was used for tall and a low note for small. The students made themselves tall or small according to sound clues.
3. As the teacher beat even and uneven rhythm, the class moved across an area (a third of the class at a time) and changed from even and uneven locomotor patterns according to the beat of the drum.

Experimental I

Lesson 11

Objectives:

1. For the students to review localization of sounds (1, 2, 11).
2. For the students to review response to one instrument sound over multi-instrument sound (3a, 9, 13).
3. For the students to respond to even and uneven rhythm (3, 5).

Equipment: Record and record player, tonette

Activity:

1. The children without looking at the teacher's position responded by moving left, right, up, and back to the tonette sound. Tone was both soft and loud.
2. The class was asked to move only when one instrument played within a multi-instrument orchestra. A dominate instrument was used first. A gradual progression was then made to more obscure instrument sounds.
3. The class played "hot and cold" with the hot clue on the uneven beat and the cold clue on the even beat.

Experimental I

Lesson 12

Objectives:

1. For the students to respond to different consonant endings (7, 12).
2. For the students to respond to different middle consonant sounds (5b, 7, 12).
3. For the students to respond to rhythm of syllables with varied but matched rhythm (5bc, 7, 12).

Equipment: Drum

Activity:

1. The children, in line formation, moved across the area either walking, hopping, or skipping as designated by the teacher. When the teacher said two words exactly alike, they moved. They froze when the words had different endings.
2. The children repeated the movement in activity 1, but responded to changes in middle sounds of the words.
3. As the teacher said words of either one, two, or three syllables, the children responded by jumping according to the number of syllables they heard. (Words as hop, hopping, hoppety, and names as Ray, Leroy, Cynthia were used.)

Experimental I

Lesson 13

Objectives:

1. For the students to respond to different syllables (12, 14).
2. For the students to respond to rhythmic tempo (5).
3. For the students to respond to story about animals and listen for the various animal sounds (7, 8).
4. For the students to review response to vowel sounds (4).

Equipment: Drum

Activity:

1. The children were asked to jump or hop one time for each syllable in each word the teacher spoke.
2. The teacher used a drum and varied the tempo from slow to fast runs with sudden stops. The children imitated the tempo with locomotor movements.
3. The teacher told a story about a trip to the Zoo. As an animal was mentioned the children responded by making the animal noise and trying to walk like that animal. They were told to pick a dandelion for each different animal they heard.

Experimental I

Lesson 13.--Continued.

4. The teacher gave sounds of all the vowels (long) and asked the children to respond by making that letter with their bodies.

Experimental I

Lesson 14

Objectives:

1. For the students to respond to differences in single words (6, 7).
2. For the students to respond to consonant-vowel combinations (6, 7, 12).
3. For the students to respond by echo to rhythmic words (5, 8).
4. For the students to respond to change in rhythm (5).

Equipment: Drum

Activity:

1. The teacher read words that were similar and words that were alike. When the words were different, the children moved with varied axial movements, and when the words were exactly alike, they froze.
2. The teacher said a consonant and vowel sound (bā, dē, fō, sū, lō, bī) and the children worked with a partner to form the two letters.
3. As the teacher recited nursery rhymes (Jack and Jill, Old Mother Hubbard, and Hi Diddle Diddle) the children moved through various locomotor patterns. When the teacher stopped, the students responded

Experimental I

Lesson 14

by saying the last word the teacher had said and by stopping all movement. As she began reciting again the class changed locomotor patterns and continued to move until she stopped.

4. The children walked, jumped, and hopped to even and uneven beats of the drum.

Experiment I

Lesson 15

Objectives:

1. For the students to respond to one, two, and three syllable words (12, 14).
2. For the students to respond to slow-fast rhythm of singing record (5).
3. For the students to respond to same and different word sounds (1e, 6, 7).

Equipment: Drum, flash cards, record player

Activity:

1. As the teacher said the names of students, using one, two, and three syllable names, the children responded to one syllable with a jump; to two syllables with a hop; and to three syllables with running.
2. Using the "Clock Song" record the class was divided into three groups. As their kind of sound was heard on the record, the students could tag others.
3. The students played "Stop, Look, and Listen." The teacher held up a card bearing a letter of the alphabet. When she said a word beginning with that letter the class could run. If the word did not begin with that letter, the children had to stop.

Experimental I

Lesson 16

Objectives:

1. For the students to respond to animal sounds over increased background noise (6, 7, 13).
2. For the students to respond to tapping rhythm (5).
3. For the students to review beginning and ending sounds of words (1e, 7, 12).

Equipment: Record player, wood blocks

Activity:

1. As the teacher played the record "Animal Walks" at a loud volume, she said different animals and the class would respond by moving like that animal. The teacher then lowered her voice to a whisper and repeated the above procedure.
2. The teacher tapped wood blocks and the children responded by walking, running, galloping, and sliding.
3. The students played "Stop, Look, and Listen" as described in Lesson 15.

Experimental I

Lesson 17

Objectives:
1. For the students to respond to instrumental record (6, 7, 13).
2. For the students to respond in a variety of ways to uneven rhythm (5).
3. For the students to respond to the relationship between visual and sound patterns (1e, 5).

Equipment: Record player, record, wood blocks

Activity:
1. The teacher repeated the "Animal Walks" record and procedure of Lesson 16.
2. The teacher played an uneven rhythm on blocks and the children responded with various locomotor movement (skip, slide, and gallop).
3. The teacher used a chalkboard and drew a dot pattern (. .. .). She then asked first one group and then another to move like the dot pattern sounded.

Experimental I

Lesson 18

Objectives:

1. For the students to respond to same sounds and different sounds (6, 7).
2. For the students to respond to differences in beginning and middle sounds of words (7, 12).
3. For the students to respond to sentence endings (8, 14).

Equipment: Cards with sentences on them

Activity:

1. The teacher said two words. When the words were exactly alike the children moved forward in some way. When the words were different, the children moved in a different way backward.
2. The children played "Crows and Cranes" with different beginning and middle sounds (rat-cat and thrash-thrush).
3. The teacher read the sentences on cards once. The sentences told them some activity to do. The children echoed the last word of the sentence. When the students had said the last word, they did the activity.

Experimental I

Lesson 19

Objectives:

1. For the students to respond to a soft noise amid loud noises (11, 13).
2. For the students to respond to high and low sounds (10).
3. For the students to review movement to uneven rhythm (5).

Equipment: Drum, tonette

Activity:

1. The teacher told the story of "City Noises." She divided the class into groups that would make the different city noises (trucks rumbling, brakes squeeking, people walking, etc.). As the children began doing their thing, the teacher walked among them and holding her hand in front of her mouth, very quietly said "Arf, Arf." When the children heard the dog sound they pretended to pick up a little dog and put him on a leash.
2. The children played "Over and Under," with a high note on the tonette the clue for over and a low note for under, as stated in Lesson 9, Experimental I.

Experimental I

Lesson 19.--Continued.

3. The students reviewed uneven rhythm patterns with drum as done in Lesson 10, Experimental I.

Experimental I

Lesson 20

Objectives:
1. For the students to respond to varying patterns of percussion instruments (3, 5).
2. For the students to respond to different word endings (7, 12).

Equipment: Wood blocks and drum

Activity:
1. Children were asked to respond to varying rhythm patterns of wood blocks and drum beats by locomotor movement. The procedure followed was the same as Lesson 10, Experimental I.
2. The children played "Crows and Cranes" with different word endings, as done in Lesson 7, Experimental I.

Experimental I

Lesson 21

Objectives:
1. For the students to respond to differences in words by action (6, 7).
2. For the students to respond to even and uneven rhythm (3, 5).

Equipment: Drum

Activity:
1. The children played a game called "Shipwreck." The children listened to verbal clues to move to various positions and mimetic shipboard activities, i.e., port, ran to left side; starboard, ran to right side; man the lifeboats, sat down and rowed; and man overboard, pretended to swim.
2. The children reviewed the gallop and slide to an uneven drum beat. The drum beat was then alternated in even and uneven rhythm and the class changed locomotor movement to fit the rhythm.

Experimental I

Lesson 22

Objectives:
1. For the students to respond to word clues of a familiar game with increased background noise (12, 13).
2. For the students to respond to high, middle, and low sounds (10).

Equipment: Tonette

Activity:
1. The children played "Shipwreck" with the same and varying word clues as the previous day. Part of the class took turns and provided distracting wind and fog horn noises.
2. The children played "Over and Under" with high tonette sound for over and low for under. The same procedure was followed as in Lesson 9, Experimental I.
3. The children reviewed high and low tones with the teacher making high or low tones on the tonette. When the tones were high the children moved forward in locomotor movements. When low, they moved backward in locomotor movements.

Experimental I

Lesson 23

Objectives:
1. For the students to respond to a soft noise over background sound (11, 13).
2. For the students to respond to last word by echo (8).
3. For the students to respond to even and uneven rhythms (5).

Equipment: Drum

Activity:
1. The teacher told the story of "City Noises." The children provided the background noise as done in Lesson 19, Experimental I.
2. As the teacher recited nursery rhymes the children moved with a type of locomotor movement. When she stopped at any point in the rhyme, the class responded by echoing the last word said. As the teacher began the rhyme again, the class moved in a different type of locomotor movement.
3. As the teacher produced either even or uneven rhythm on the drum, the class responded (one-third at a time) by moving across the play area with even or uneven locomotor movements.

Experimental I

Lesson 24

Objectives:

1. For the students to respond to different word endings (7, 12).
2. For the students to respond to varying patterns of percussion instruments (5).
3. For the students to respond to consonant and vowel sounds (6, 7a).

Equipment: Wood block

Activity:

1. The children played "Crows and Cranes" with different word endings as done in Lesson 7, Experimental I.
2. As the teacher played even and uneven rhythms on wood blocks, the children responded with even or uneven locomotor movements. The major concentration was on the uneven rhythms using the gallop and slide.
3. As the teacher said various consonants and vowels, the children formed the shape with various body parts or their whole body.

Experimental I

Lesson 25

Objectives:

1. For the students to review rhythm response (5).
2. For the students to respond to words with various syllables (12, 14).
3. For the students to respond to beginning word sounds (7, 12).

Equipment: Wood blocks, drum, flash cards

Activity:

1. As the teacher beat even and uneven rhythms with the drum and wood blocks the children responded with locomotor movement.
2. As the teacher said words or names of students with one, two, or three syllables, the students responded by either hopping or jumping for each of the syllables. The same technique was used in Lesson 12, Experimental I.
3. The students played "Stop, Look and Listen." The teacher held up a flash card with a letter of the alphabet. When the word she said began with that letter, all children could run. When it did not begin with that letter, the children froze (stood still).

Experimental I

Lesson 26

Objectives:

1. For the students to respond to slow-fast rhythm of singing record (5).
2. For the students to respond to sounds with different timber (3, 5c).
3. For the students to respond to animal sounds over increased background noise (5, 9, 13).

Equipment: Record, record player, crickets, triangle, drum, wood blocks, sand blocks

Activity:

1. The teacher played the record, "Clock Song." The class was divided into three groups and when their kind of clock sound was heard they moved any way they wished with the rhythm of their clock sound.
2. The teacher made a variety of sounds with noisemakers and the children responded in free movement activities. The free movement activities changed with each different kind of sound.
3. The teacher played the record "Animal Walks" at a soft and then gradually louder volume. The teacher said the names of animals in a moderate tone and the children

Experimental I

Lesson 26.--Continued.

responded with imitative walks of that particular animal.

Experimental I

Lesson 27

Objectives:

1. For the students to respond to word clues of a familiar game with background noise (12, 13).
2. For the students to respond to consonant and vowel combinations (6, 7).
3. For the students to respond to even and uneven rhythm (5).

Equipment: Drum

Activity:

1. The children played the game "Shipwreck." Part of the class took turns providing background noise of wind and fog horn while the teacher gave word clues to the rest of the class. See Lesson 21, Experimental I.
2. The teacher used consonants (p, t, m, n, k) with various vowels and pupils responded with partners. One child made the consonant with some part of his body and the other child made the vowel.
3. The teacher used a drum to beat an even and an uneven rhythm. Children changed locomotor movements as the drum changed from an even to an uneven rhythm.

Experimental II

Lesson 1

Objectives:

1. For the students to be able to localize pure sound (1, 2).
2. For the students to respond to pure tone, simple rhythm (2, 3, 5ab).

Equipment: Drum, rattle, tonette, and piano

Lesson:

1. The teacher took a position in back of the students and made various sounds with instruments. The students were asked to raise their hands when rhythm was fast and to lower their hands as the rhythm became slow.
2. The teacher took a position in back of the students and moved right and left of an established midpoint in the room. The students were asked to mark on a paper tablet in the left or right hand column according to the position of the sound. As students responded well to sounds definitely to the far right and the far left, the teacher moved less and less to the right and left.
3. The children played "hot or cold." The teacher selected an object in the room

Experimental II

Lesson 1.--Continued.

and the students attempted to guess it. When the guess was close the drum beat was loud. When the guess was cold, the drum beat was soft.

Experimental II

Lesson 2

Objectives:

1. For the students to review localization of sound in space (1, 2, 13).
2. For the students to respond to pure tone, simple rhythm (2, 3, 5ab).
3. For the students to respond to simple rhythm with various intensities (3, 5c).

Equipment: Drum, rattle, bells, tonette, triangle, wood blocks

Lesson:

1. The teacher took a position in back of the students and moved, making sounds with various instruments.
2. Six children with instruments took a position at the back of the class. Each child played in sequence and then all played together. Members of the class, when called upon, pointed to the instrument designated by the teacher. Clapping was used as a distracting noise.
3. The children worked on simple rhythm patterns by clapping.

Experimental II

Lesson 3

Objectives:

1. For the students to respond to intensity variation of pure tone (3, 5).
2. For the students to respond to one instrument with varying rhythms (3, 5, 9).
3. For the students to respond to soft and loud sounds of different intensity at different rhythms (3, 5, 9, 11).

Equipment: Drum, record player, whistle, bells, button, record "Clock Song"

Lesson:

1. The teacher played soft and loud drum beats. The children were to respond by holding up a big paper drum when the beat was loud, and a small paper drum when the beat was soft.
2. The children were asked to respond to "Clock Song" with even and uneven beats by tapping and clapping.
3. The teacher used various instruments for sound. The children were asked to hold up a rabbit when the sound was fast and a turtle when the sound was slow.
4. A classroom game "Button, Button Who's Got the Button," was played. An even beat

Experimental II

Lesson 4

Objectives:

1. For the students to respond to consonant and vowel sounds (4, 6, 7a).
2. For the students to respond to consonant and vowel sounds of varying intensity (4, 6, 7a, 11).
3. For the students to respond to different tempos of nonverbal sounds (3, 5, 9).

Equipment: Button, drum, paper, and crayons

Lesson:

1. Using normal intensity, the teacher said consonants and vowels and the children indicated what they heard by making the letter on paper (M, L, S, F, K, T).
2. Using a whisper or soft sound, the teacher said consonants and vowels and children responded by making that letter on paper (o, w, d, b).
3. The children played "Button, Button." Even rhythm was used on the drum when they were cold and uneven rhythm was used when they were hot. See Lesson 3, Experimental II.

Experimental II

Lesson 5

Objectives:

1. For the students to review localization of sound in space (1, 2).
2. For the students to respond to vowel sounds (4).
3. For the students to respond to different rhythms and varying intensities of sounds (3, 5, 9, 11).

Equipment: Paper, pencils, drum, and tonette

Lesson:

1. The teacher assumed a position in back of the students and made pure tone sounds with a tonette. The children indicated on paper whether the sound moved left or right.
2. As the teacher said the vowels $\bar{o}$ and $\bar{u}$ the children wrote the letters on paper.
3. The teacher beat various tempos and rhythms with a drum and asked the children to respond by holding up a turtle when slow and a rabbit when fast.
4. The children played "Button, Button" with even and uneven rhythm for clues. See Lesson 3, Experimental II.

Experimental II

Lesson 6

Objectives:

1. For the students to respond to one instrument sound over a distracting noise (3, 5, 13).
2. For the students to respond to vowel sounds (4, 5a).
3. For the students to respond to tempo and intensity variations of pure tone (3, 5, 9, 11).

Equipment: Record player, record "Old MacDonald," drum, button

Lesson:

1. While the teacher used the drum in selected rhythm, the children clapped in time to the drum. The "Old MacDonald" record was added for distracting noise.
2. The teacher reviewed sounds of $\bar{o}$ and $\bar{u}$ and then added $\bar{i}$ and $\bar{a}$ sounds. The children responded verbally and then wrote the letters down on paper.
3. The teacher played the drum slow and fast with loud and soft variations. The students responded by holding the paper drum up when the beat was slow. When the beat was fast they held the paper drum down.

Experimental II

Lesson 7

Objectives:

1. For the students to respond to vowel sounds (4, 5a).
2. For the students to respond to consonant sounds (6, 7e).
3. For the students to respond to different beginning consonant sounds (7, 12).

Equipment: Picture of a bird's nest for each child

Lesson:

1. The teacher said vowels $\bar{a}$, $\bar{o}$, $\bar{u}$, $\bar{i}$, and $\bar{e}$. The children responded by writing the letters on paper.
2. The teacher said a word beginning with a consonant (bat, pat, moo, woof, hat). The children then wrote the beginning consonant letter.
3. The teacher said pairs of words beginning with consonants (bat-pat, moo-moo, how-wow, coat-coat, pace-race, rat-cat). When the two words she said began with the same consonant, the children colored the nest yellow. When the words began with different consonants the children colored the nest brown.

Experimental II

Lesson 8

Objectives:

1. For the students to review response to consonant and vowel sounds (6, 7c).
2. For the students to respond to one instrument sounds over multi-instrument sounds (3, 5, 13).
3. For the students to respond to differences in intensity of sounds (5, 11).

Equipment: Horn, drum, and banjo made of paper for each child; drum; Herb Alpert record

Lesson:

1. The teacher said the letters of the alphabet and asked children to respond by drawing the letters on paper.
2. As the record played, the teacher identified the horn, banjo, and drum. She asked the children to hold up their paper instrument when they heard the sound of that instrument.
3. The teacher used soft and loud drum beats. The children responded by holding up a drum when the beat was soft and lowering drum when the beat was loud.

Experimental II

Lesson 9

Objectives:
1. For the students to respond by echo and identify animal noises (6, 7, 8).
2. For the students to respond to loud and soft sounds in a rhythm variation (5, 11).
3. For the students to respond to high and low tones (3, 10).

Equipment: Drum and piano, animal pictures, large and small drum

Lesson:
1. As the teacher told a story about a trip to a farm, the children echoed animal sounds and held up pictures of each animal.
2. The teacher played varying rhythms on the drum using soft and loud intensity. The children responded by holding up a large drum when the rhythm was loud, and a small drum when the rhythm was soft.
3. The teacher played high and low notes on the piano. Children responded by writing on their paper an H when high and L when low.

Experimental II

Lesson 10

Objectives:

1. For the students to respond to different consonant endings (7, 12).
2. For the students to respond to high and low tones (3, 10).
3. For the students to respond to even and uneven rhythm (3, 5).

Equipment: Pipe cleaners, paper

Lesson:

1. The teacher said two words that began the same, but had different consonant endings (cap-cat, cab-cab, nap-nack, etc.). When the words were the same the children marked an "S"; if they were different, they marked a "D" on their paper.
2. The children played "I am very tall or small." A high note on tonette was used for tall and a low note for small. The children responded by holding a pipe cleaner straight for tall and bent for small.
3. As the teacher played an even or uneven rhythm on the drum, the class responded by tapping the table with their fingers.

Experimental II

Lesson 11

Objectives:

1. For the students to review localization of sounds (1, 2, 11).
2. For the students to review response to one instrument sound over multi-instrument sound (3a, 9, 13).
3. For the students to respond to even and uneven rhythm (3, 5).

Equipment: Record and record player, tonette

Lesson:

1. Without looking, the children were asked to track sound movement on paper. The sounds varied in intensity.
2. The teacher selected an instrument from an orchestra and helped the children recognize the sound of that instrument. Then, while listening to the orchestra, the children held up a paper figure of an instrument when that instrument was predominant. The sound of the instrument varied from a dominate to a more obscure sound.
3. The children played "Button, Button," using even and uneven rhythms for clues. See Lesson 3, Experimental II.

Experimental II

Lesson 12

Objectives:
1. For the students to respond to different consonant endings (7, 12).
2. For the students to respond to different middle consonant sounds (5b, 7, 12).
3. For the students to respond to rhythm of syllables with varied but matching rhythm (5bc, 7, 12).

Equipment: Drum, twin cutouts

Lesson
1. As the teacher said two words that had exactly the same consonant endings, the children held up paper twins.
2. Activity 1 was repeated, but the children listened for changes in middle sounds of words.
3. As the teacher said words of either one, two, or three syllables, the children responded by holding up one, two, or three fingers (hop, hopping, hoppity and names like Pam, Virgil, Theresa).

Experimental II

Lesson 13

Objectives:

1. For the students to respond to different syllables (12, 14).
2. For the students to respond to rhythmic tempo (5).
3. For the students to respond to a story about animals and listen for various animal sounds (7, 8).
4. For the students to review response to vowel sounds (4).

Equipment: Drum, paper numbers one, two, and three

Lesson:

1. As the teacher said words of one, two, or three syllables, the children held up a paper number 1, 2, or 3 to make the number of syllables.
2. The teacher used a drum to beat short and long sounds and the children were asked to mark on paper short and long sounds (- ---).
3. The teacher told a story about a trip to the Zoo. She asked questions about animals and children responded, in groups, by making the noise of the animal.
4. The teacher said vowel sounds and students wrote the letter of the sound on paper.

Experimental II

Lesson 14

Objectives:

1. For the students to respond to differences in single words (6, 7).
2. For the students to respond to consonant-vowel combinations (6, 7, 12).
3. For the students to respond by echo to rhythmic words (5, 8).
4. For the students to respond to change in rhythm (5).

Equipment: Drum

Lesson:

1. The teacher said words that were similar or words that were alike. If the words were alike the children wrote the letter of the last sounds heard.
2. The teacher said consonant and vowel sounds. The children made the first and last sound of the word.
3. The teacher recited nursery rhymes. When she stopped, students responded by echoing the last word that she had said.
4. The teacher beat two successive drum rhythms. The children were asked to say whether the rhythms were same or different.

Experimental II

Lesson 15

Objectives:

1. For the students to respond to one, two, and three syllable words (12, 14).
2. For the students to respond to slow-fast rhythm of singing record (5).
3. For the students to respond to same and different word sounds (13, 6, 7).

Equipment: Record player and paper

Lesson:

1. The class had paper with columns numbered 1, 2, and 3. When the teacher said a one-syllable word they made an x under the one column; if two syllables were said an x was placed in the two column. When the children heard three syllables, an x was placed in the three column.
2. The teacher played the "Clock Song." As the children listened to the record, they clapped to the rhythm of each clock.
3. The children played "Stop, Look and Listen." The teacher held up a card with a letter of the alphabet. When she said a word beginning with that letter, the class colored. When the word did not begin with that letter the class stopped coloring.

Experimental II

Lesson 16

Objectives:
1. For the students to respond to animal sounds over increased background noises (6, 7, 13).
2. For the students to respond to tapping rhythm (5).
3. For the students to review beginning and ending sounds of words (1e, 7, 12).

Equipment: Wood blocks, paper, record player, and record

Lesson:
1. As the teacher played the record "Animal Walks" she called the names of different animals. The class responded by drawing that animal. When asked, the children made the sound of that animal.
2. The teacher tapped wood blocks and the children responded by clapping the same rhythm of the blocks.
3. The children played "Stop, Look and Listen." See Lesson 15, Experimental II.

Experimental II

Lesson 17

Objectives:

1. For the students to respond to instrumental record (6, 7, 13).
2. For the students to respond in a variety of ways to uneven rhythm (5).
3. For the students to respond to the relationship between visual and sound patterns (1e, 5).

Equipment: Record player, record, wood blocks, paper, crayons

Lesson:

1. The class repeated the record "Animal Walks," as done in Lesson 16.
2. As the teacher played uneven rhythm, the class colored, drew, or clapped. When the children heard an even rhythm they stopped what they were doing.
3. The teacher played a rhythm pattern (beginning with a very short pattern), and the class drew the pattern on paper (. .. .).

Experimental II

Lesson 18

Objectives:

1. For the students to respond to the same sound and different sounds (6, 7).
2. For the students to respond to differences in beginning and middle sounds in words (7, 12).
3. For the students to respond to sentence endings (8, 14).

Equipment: Cards with sentences, paper twins

Lesson:

1. The teacher said two words. If they were exactly alike, the children held up paper twins. See Lesson 12.
2. The teacher said two words that were alike except for the beginning consonant. The children wrote the two different consonants. When the words had the same consonant, the children made one letter. This technique was repeated using different middle sounds and the paper twins.
3. The teacher read sentences on cards only once. The children said the last word of the sentence and then followed the instructions of the sentence (you may draw a tree).

Experimental II

Lesson 19

Objectives:
1. For the students to respond to a soft noise amid loud noises (11, 13).
2. For the students to respond to high and low sounds (10).
3. For the students to review movement to uneven rhythm (5).

Equipment: Drum, tonette, pipe cleaners

Lesson:
1. The teacher told the story of "City Noises." She gave each table of children a noise of the city to make. As each table made the noises, the teacher, with her hand over her mouth, quietly said "Arf, Arf." When the children heard the dog sound, they quit making their noise and drew a picture of a dog.
2. The children played "I'm Very Tall or Small." A tonette high note was used for tall, and a tonette low note was used for small. The children responded with pipe cleaner figures. See Lesson 10.
3. The children reviewed uneven rhythm patterns with a drum.

Experimental II

Lesson 20

Objectives:

1. For the students to respond to varying patterns of percussion instruments (3, 5).
2. For the students to respond to different word endings (7, 12).

Equipment: Wood blocks and drum

Lesson:

1. The children were asked to respond to varying rhythm patterns of wood blocks and drum beats by tapping out rhythm on the table.
2. The teacher said words with different consonant endings. The children marked in their workbooks the letter of the ending of each word.

Experimental II

Lesson 21

Objectives:
1. For the students to respond to differences of words by workbook (6, 7).
2. For the students to respond to even and uneven rhythm (3, 5).

Equipment: Drum, picture of ship, paper

Lesson:
1. The children played a modified game of "Shipwreck." The classroom version had children listening to verbal clues and marking appropriate positions or drawing a picture of action (port, marked an X on the left side of ship; man overboard, drew a picture of a swimmer). The teacher placed examples on the board and had a practice session first.
2. The teacher played even and uneven rhythms on the drum; children drew a bumpy line if the rhythm was uneven and a smooth line if it was even.

Experimental II

Lesson 22

Objectives:

1. For the students to respond to word clues of a familiar game with increased background noise (12, 13).
2. For the students to respond to high, middle, and low sounds (10).

Equipment: Tonette, pipe cleaners

Lesson:

1. The children played "Shipwreck," as done in Lesson 21. Part of the class took turns providing background noise of wind and fog horn.
2. The teacher made high, medium, and low sounds on the tonette and asked the children to write H if high and L if low.
3. The teacher continued the review of high and low sounds. She asked the children to respond by making pipe cleaners as tall as possible for a high tone and as short as possible, by bending, for low tone.

Experimental II

Lesson 23

Objectives:
1. For the students to respond to a soft noise over background sound (11, 13).
2. For the students to respond to the last word heard by echo (8).
3. For the students to respond to even and uneven rhythm (5).

Equipment: Drum and paper

Lesson:
1. The teacher told the story of "City Noises." See Lesson 19.
2. The teacher recited nursery rhymes, and when she stopped at any point in the rhyme, the children responded by echoing the last word she had said.
3. As the teacher produced either even or uneven rhythm on the drum, the children responded by drawing even or uneven (wavy) lines on paper.

Experimental II

Lesson 24

Objectives:

1. For the students to respond to different word endings (7, 12).
2. For the students to respond to varying patterns of percussion instruments (5).
3. For the students to respond to consonant and vowel sounds (6, 7a).

Equipment: Wood block and paper

Lesson:

1. The teacher used words with different consonant endings and asked the children to make an "S" when hearing the same one and a "D" when hearing a different one.
2. The teacher played even and uneven rhythms on the wood blocks. The children responded by saying whether the teacher had played an even or uneven rhythm.
3. As the teacher said the sounds of various consonants and vowels, the children responded by making the letter on paper.

Experimental II

Lesson 25

Objectives:

1. For the students to review rhythm response (5).
2. For the students to respond to words with various syllables (12, 14).
3. For the students to respond to beginning word sounds (7, 12).

Equipment: Wood blocks, drum, flash cards, paper

Lesson:

1. As the teacher played even and uneven rhythm on the drum and wood blocks, the children responded by saying whether the rhythm was even or uneven.
2. As the teacher said words or names of students using one, two, or three syllables, the students responded by holding up one, two, or three fingers to match the syllables of the word said.
3. As the teacher held up an alphabet flash card, she said a word that either did or did not begin with that letter. When the word began with that letter, the children held up their hands. If it did not begin with that letter, there was no response from the children.

Experimental II

Lesson 26

Objectives:

1. For the students to respond to slow-fast rhythm of singing record (5).
2. For the students to respond to sounds with different timber (3, 5c).
3. For the students to respond to animal sounds over increased background noise (5, 9, 13).

Equipment: Record, record player, crickets, triangle, drum, wood blocks, sand blocks

Lesson:

1. The teacher played the record "Clock Song." The class was divided into three groups, one for each clock sound. When the group heard their assigned clock sound on the record, they held up their hands.
2. As the teacher made different sounds on instruments, the children responded by raising their hands and verbally identifying the sound.
3. The teacher played the record "Animal Walks." The volume was low at first and was gradually increased. The teacher said names of animals in a moderate tone and

Experimental II

Lesson 26.--Continued.

the children responded by making the sound of that animal.

Experimental II

Lesson 27

Objectives:

1. For the students to respond to word clues of a familiar game with background noise (12, 13).
2. For the students to respond to consonant and vowel combinations (6, 7).
3. For the students to respond to even and uneven rhythm (5).

Equipment: Drum, paper, button, picture of ship

Lesson:

1. The children played the game "Shipwreck" (classroom version), Lesson 21 reviewed. The class took turns providing background noise of fog and wind.
2. The teacher used consonants (p, t, m, n, k) with various vowel combinations. The class responded by tables. While the children at one table wrote the consonant letter on paper, the children at a nearby table wrote the vowel letter.
3. The class played "Button, Button." See Lesson 3, Experimental II.

Rationale Points for the Lesson Objectives in the Experimental I, Experimental II Lesson Plans

1. Training begins with unisensory control and progresses to multisensory control.

   a. "Any aural rehabilitation program should provide training with reduced cues so that the person can learn to associate meaning with minimal information in the auditory in-put system" (48, p. 94).

   b. Dr. Werik Edenberg began training his son by speaking into the ear in order to develop audition without the aid of visual cues (16, p. 590).

   c. The author's observation of auditory training methods in schools for the deaf noted that kinesthetic stimulus (tapping on the arm or shoulder) was added only after failure with aural stimulus.

   d. "Itard experimented with blindfolded deaf persons and discovered that repeated sound stimulation produced noticeable increase in response" (49, p. 52).

   e. "Hudgins presented data which vividly portrayed the gains that can be made through a bisensory (eye-ear) approach to aural rehabilitation" (45, p. 54).

2. Localization of sound in space is a primary skill in development of auditory modality.

   a. "In normal child development exploration of the auditory environment is necessarily and closely related to capacity to explore the visual environment" (18, p. 29).

   b. Gressell reports that by the age of four to six months it is normal for babies to have begun to develop the ability to localize sound with eyes and head movements (21).

   c. As a child develops, "Less and less of what he hears is without meaning. . . . He reaches a stage when he no longer needs to look. Sound by itself has become meaningful" (18, p. 31).

   d. "In an auditory study feedback and no feedback conditions were compared, and the effect of

introducing anchor or reference tones was investigated. Feedback increased the proportion of correct detections as did the presence of strong anchor. The letter reduced false alarms." (66, p. 267).

3. Training should begin with pure tone and then add combined sounds.

   a. "Listening for the specific sound should come first, followed by discrimination between the given sound and other similar sound elements" (51, p. 75).

   b. One of the two types of hearing development is "The development of unvoiced sounds" (40, p. 180).

   c. "Begin at the level of simple environmental sounds which the person tries to identify. This training will help develop an awareness of sound and give practice in gross discriminations" (48, p. 84).

   d. "A first in auditory discrimination activities can be to have children perceive likenesses and differences in non-vocal sounds and to perceive the sound of recurring rhyming words" (37, p. 154).

   e. Lesson 2 at the first level ABC of Auditory Training, Sister James Hogan, St. Joseph Institute for Deaf, St. Louis, Mo. The first lesson involves getting on the hearing aid. The second or first auditory training lesson is the use of gross sounds (p. 9).

4. Auditory training in speech sounds should begin with vowel sounds.

   a. "Begin drills with vowels" (2, p. 41).

   b. "Training began by saying vowels furthest apart" (16, p. 590).

   c. Lesson 3 at the first level ABC of Auditory Training (p. 110).

5. Training should begin with simple rhythm and then add variations.

a. "We proceeded upon the principle of the gradual complication of acoustic differentiations and gradual increase of their length. Acoustic differentiation is possible on the basis of five fundamental sound criteria: divisibility of phonation, its length, intensity, frequency characteristics, and a complex rhythmic pause criterion" (36, p. 206).

b. "A first in auditory discrimination activities can be to have children perceive likenesses and differences in non-vocal sounds and to perceive the sound of recurring rhyming words" (37, p. 154).

c. Under suggestions for developing listening skills, Monroe and Rogers suggest, "Games that call attention to intensity, games that call attention to pitch, games that call attention to quality, games for duration and sequence (rhythms and creative movement)" (43, p. 69).

6. Progression should be from vowel sounds to easy consonant sounds in the low range.

a. "The results of the experiments (with deaf) indicate the fact that after a series of special exercises, based upon the principle of intermittent opposition of the various phonemes and the gradual transition from coarser differentiations to differentiations of a finer nature, auditory perception of speech sound becomes far more differentiated in deaf-mute children" (3, p. 170).

b. Oyer indicates the earlier consonants usually mastered are b, p, m, w, h (49, p. 59).

7. The use of easy consonant combined with vowel sound in the low range (these include animal noises).

a. The progressive steps suggested by Battin and Haug include bilabial consonants like pa, easy consonants with same vowels like mah, tah, wah, and combined easy consonants with various vowels (2, p. 41).

b. Streng, Fitch, et al., suggest consonant discrimination by responding to last word, i.e.: calf - cat, hog - dog, etc. (59, p. 215).

c. Morkovin suggests as a teaching-learning activity a trip to the Zoo with animal sounds and actions as combined consonant vowel sounds (44, p. 56).

8. Echo sounds are a stage in developmental pattern.

   a. Oyer, in discussing the stages of language development, describes the last fourth of the first year as echolalia or echo sound. Echolalia follows the babbling stage and Oyer says, "Auditory training can be important from babbling stage on" (49, p. 59).

   b. Lowell and Stoner suggest an activity to increase audition, such as responding to the last word in a pome like, "Jack and Jill." The students say the last word before stopping some action (37, p. 147).

9. Records are a valuable aid in auditory training. Begin with single music sounds and progress to combined musical sounds and speech sounds.

   a. "If possible, the teacher needs to create a new atmosphere for listening, an atmosphere in which children want to attend to certain sounds because it's fun to do so, and in which they want to develop sensitivity to certain sounds, because the ability to discriminate correctly leads to pleasant rewards" (43, p. 68).

   b. "If recorded songs are used, those with a single voice and single instrument accompaniment are easier to follow than choral-orchestral type" (59, p. 214).

   c. "Begin with music only and gradually combine with simple children songs" (68, p. 143).

10. Children should be able to distinguish between high and low sounds.

   a. Monroe and Rogers suggest games that call attention to pitch (up and down) as being effective in auditory training (43, p. 69).

11. Children should be able to distinguish between loud and soft sounds.

   a. Monroe suggests as auditory training games such as "loud and soft" (42, p. 118).

   b. "Loud and soft sounds should be called to the attention of little children. Loud stamping can be compared to tip-toeing" (59, p. 212).

12. Children should hear differences in words (beginning, middle and endings).

    a. "Discrimination exercises, games or drills involve either recognizing likenesses or differences between words and sounds" (59, p. 215).

    b. Whitehurst gives examples of different medial, final and beginning sounds to be used in training. Also she lists contrasts such as shore - chore, etc. (64, p. 17).

13. The background noise level should be raised when the drill becomes easy.

    a. "The final step is listening against background noise and then increasing the level" (48, p. 84).

    b. Geisperger comments on listening "The student structures acoustical material himself. He has to put one acoustical figure into the focus of attention" (19, p. 309).

14. Children should hear pitch variations and differences in sentences.

    a. Exercises in auditory training are "1. word and sentences, 2 syllables different, 2. word and sentences, 3 syllables different, and 3. acoustically similar words and sentences" (36, p. 206).

    b. "Presenting speech stimuli to deaf children, an effort should be made to have time to arrive at some degree of understanding of these various qualities of speech, rhythm, and accent" (ABC of Auditory Training, p. 5).

Resource List for Lessons

1. "Animal Walks" Album K2090
   Educational Activities, Inc.
   Freeport, L.I. New York 11520

2. "City Noises" Kuskin, Karla. All Kinds of Noises. New York and Evanston: Harper Row, 1962.

3. "Clock Song" Sing and Do Songs. Album 2. Sing and Do Co., Ridgewood, N.J.

4. "Crows and Cranes" Corbin, Charles. Becoming Physically Educated in the Elementary School. Philadelphia: Lea & Febiger, 1969.

5. "I'm Very Small" Missouri Guide for Physical Education in Elementary School. Department of Education, Jefferson City, Mo., 1955.

6. "Shipwreck" Miller & Whitcomb. Physical Education in the Elementary School Curriculum. Englewood Cliffs, New Jersey: Prentice-Hall, Inc., 1969.

7. "Stop, Look & Listen" Humphrey, James. Child Learning Through Physical Education. Dubuque, Iowa: Wm. C. Brown, 1965.

APPENDIX B

TESTS

WEPMAN TEST

	Exp. I		Exp. II		Control	
	X	Y	X	Y	X	Y
BOYS	22	17	22	27	21	25
	22	20	20	19	21	22
	22	25	21	25	20	26
	19	21	19	24	19	24
	19	17	18	24	19	24
	20	21	20	26	18	18
	17	28	19	19	16	17
	18	24	17	23	17	23
	15	18	14	18	14	24
	16	20	15	16	16	19
	5	24	13	19	9	22
	195	235	198	240	190	244
GIRLS	25	24	22	27	23	22
	21	23	20	19	24	23
	21	18	21	25	20	19
	21	26	19	24	21	24
	20	25	18	24	21	18
	19	25	20	26	19	22
	20	22	19	19	18	24
	20	26	17	23	17	20
	13	20	14	18	16	23
	13	20	15	16	14	19
	9	13	13	19	9	12
	202	242	193	249	202	226

WEPMAN AUDITORY DISCRIMINATION TEST
SUMMARY TABLES

	Exp. I		Control		Totals	
	X	Y	X	Y	X	Y
Boys	195	235	190	244	385	479
Girls	202	242	202	226	404	468
Totals	397	477	392	470	789	947

	Exp. II		Control		Totals	
	X	Y	X	Y	X	Y
Boys	198	240	190	244	388	484
Girls	193	249	202	226	395	475
Totals	391	489	392	470	783	959

	Exp. I		Exp. II		Totals	
	X	Y	X	Y	X	Y
Boys	195	235	198	240	393	475
Girls	202	242	193	249	395	491
Totals	397	477	391	489	788	966

TENVAD
RAW SCORES

	Exp. I		Exp. II		Control	
	X	Y	X	Y	X	Y
BOYS	36	41	38	39	39	42
	33	31	38	24	34	36
	33	24	38	40	32	33
	32	32	34	28	32	35
	31	35	33	37	32	27
	27	34	32	32	31	37
	27	31	29	25	29	24
	25	37	28	31	28	21
	24	28	28	31	28	23
	22	28	25	25	26	26
	18	32	25	28	23	31
GIRLS	37	36	38	35	41	44
	37	33	38	26	35	26
	31	38	35	40	32	37
	31	32	34	36	31	38
	31	31	32	38	31	34
	28	32	30	35	31	32
	27	26	30	26	30	28
	26	29	30	36	28	32
	25	19	29	34	22	29
	23	30	29	27	22	16
	18	35	26	30	19	33

TENVAD
SUMMARY TABLES

	Exp. I		Control		Totals	
	X	Y	X	Y	X	Y
Boys	308	353	334	335	642	688
Girls	314	341	322	349	636	690
Totals	622	694	656	684	1278	1378

	Exp. II		Control		Totals	
	X	Y	X	Y	X	Y
Boys	348	340	334	335	682	675
Girls	351	363	322	349	673	712
Totals	699	703	656	684	1355	1387

	Exp. I		Exp. II		Totals	
	X	Y	X	Y	X	Y
Boys	308	353	348	340	656	693
Girls	314	341	351	363	665	704
Totals	622	694	699	703	1321	1397

TENVAD SUB-TEST RHYTHM

	Exp. I		Exp. II		Control	
	X	Y	X	Y	X	Y
	8	8	10	10	9	9
	7	6	9	6	9	5
	6	9	8	5	8	6
	6	8	7	7	8	4
	5	4	6	7	7	10
BOYS	5	7	6	5	7	6
	5	5	5	8	7	5
	5	4	5	5	6	6
	5	7	5	4	5	4
	5	7	5	6	5	2
	4	7	4	7	4	5
	8	6	10	10	10	10
	8	7	8	9	8	7
	7	6	7	5	6	6
	7	4	7	8	5	8
	7	7	6	8	5	5
GIRLS	7	8	6	7	5	9
	6	6	6	9	5	4
	5	6	6	8	4	8
	5	5	5	6	2	6
	3	5	5	8	2	4
	1	7	4	3	1	1

TENVAD SUBTEST RHYTHM
SUMMARY TABLES

	Exp. I		Control		Totals	
	X	Y	X	Y	X	Y
Boys	61	72	75	62	136	134
Girls	64	67	53	68	117	135
Totals	125	139	128	130	253	269

	Exp. II		Control		Totals	
	X	Y	X	Y	X	Y
Boys	70	70	75	62	145	132
Girls	70	81	53	68	123	149
Totals	140	151	128	130	268	281

	Exp. I		Exp. II		Totals	
	X	Y	X	Y	X	Y
Boys	61	72	70	70	131	142
Girls	64	67	70	81	134	148
Totals	125	139	140	151	265	290

METROPOLITAN READINESS

	Exp. I		Exp. II		Control	
	X	Y	X	Y	X	Y
	85	86	92	91	89	99
	84	91	83	87	85	84
	84	85	80	92	78	73
	77	84	77	67	73	72
	75	82	75	76	71	80
BOYS	72	77	73	80	70	79
	72	73	68	72	69	78
	69	69	68	81	68	72
	69	76	66	76	64	65
	69	75	62	70	60	56
	68	74	51	55	49	54
	81	90	82	87	86	84
	71	80	78	72	84	87
	72	76	74	86	79	81
	67	72	74	75	78	86
	65	75	72	85	78	83
GIRLS	65	61	72	74	76	82
	64	67	72	79	76	82
	64	70	72	59	72	75
	53	71	61	61	71	69
	53	49	54	60	63	77
	43	66	46	51	47	39

METROPOLITAN READINESS
SUMMARY TABLES

	Exp. I		Control		Totals	
	X	Y	X	Y	X	Y
Boys	824	872	776	812	1600	1684
Girls	698	777	810	845	1508	1622
Totals	1522	1649	1586	1657	3108	3306

	Exp. II		Control		Totals	
	X	Y	X	Y	X	Y
Boys	795	847	776	812	1571	1659
Girls	757	789	810	845	1567	1634
Totals	1552	1636	1586	1657	3138	3293

	Exp. I		Exp. II		Totals	
	X	Y	X	Y	X	Y
Boys	824	872	795	847	1619	1719
Girls	698	777	757	789	1455	1566
Totals	1522	1649	1552	1636	3074	3285

Computational Formula (60, p. 606)

$1x = \Gamma_x^2/npq$	$1xy = \Gamma_x\Gamma_y/npq$	$1y = \Gamma_y^2/npq$
$2x = \Sigma x^2$	$2xy = \Sigma xy$	$2y = \Sigma y^2$
$3x = \Sigma P_x^2/nq$	$3xy = \Sigma P_xP_y/nq$	$3y = \Sigma P_y^2/nq$
$4x = \Sigma q_x^2/np$	$4xy = \Sigma q_xq_y/np$	$4y = \Sigma q_y^2/np$
$5x = \Sigma Pq_x^2/n$	$5xy = \Sigma P_{qx}P_{qy}/n$	$5y = \Sigma Pq_y^2/n$
$6x = \Sigma P^2$	$6xy = \Sigma P_yP_y/q$	$6y = \Sigma P_2$
$Axx = (3x)-(1x)$	$Axy = (3xy)-(1xy)$	$Ayy = (3y)-(1y)$
$Bxx = (4x)-(1x)$	$Bxy = (4xy)-(1xy)$	$Byy = (4y)-(1y)$
$ABxx = (5x)-(3x)-(4x)+(1x)$	$ABxy = (5xy)-(3xy)-(4xy)+(1xy)$	$AByy = (5y)-(3y)-(4y)+(1y)$
$Pxx = (6x)-(3x)$	$Pxy = (6xy)-(3xy)$	$Pyy = (6y)-(3y)$
$Exx = (2x)-(5x)-(6x)+(3x)$	$Exy = (2xy)-(5xy)-(6xy)+(3xy)$	$Eyy = (2y)-(5y)-(6y)+(3y)$

$$*E'yy = Eyy - (Ex^2y/Exx) \qquad P'yy = Pyy - (Px^2y/Pxx)$$

$$A'yy = Ayy + Pyy - \frac{(Axy + Pxy)^2}{Axx + Pxx} - P'yy$$

$$B'yy = Byy + Eyy - \frac{(Bxy + Exy)^2}{Bxx + Exx} - E'yy$$

$$AB'yy = AByy + Eyy - \frac{(ABxy + Exy)^2}{ABxx + Exx} - E'yy$$

n = number of pairs
p = number of sexes
q = number of treatmen
Γ = observation

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