CREATIVE DANCE/MOVEMENT WITH HEARING IMPAIRED INTERMEDIATE LEVEL STUDENTS

A THESIS

SUBMITTED IN PARTIAL FULFILLMENT OF THE REQUIREMENTS

FOR THE DEGREE OF MASTER OF ARTS

IN THE GRADUATE SCHOOL OF THE

TEXAS WOMAN'S UNIVERSITY

COLLEGE OF HEALTH, PHYSICAL

EDUCATION, AND RECREATION

BY

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DENTON, TEXAS

DECEMBER 1980

ACKNOWLEDGEMENTS

The investigator wishes to express her gratitude to Dr. Claudine Sherrill, chairman of the committee, for her encouragement, support, and professional direction throughout the progress of this thesis.

Many thanks are extended to the writer's committee, Dr. Jane Mott, Mr. Mike Henry, Mrs. Gladys Keeton, for their time and suggestions during the preparation of this thesis.

A special thanks to the students, teachers, and administrators of the Salt Lake City, Utah, Extension Classes, Oral and Total Communication Divisions, who made this study possible.

To the many people who aided in various aspects of this thesis, especially Renee Richmann, Chris Morhlock, Jim Estes, Luke Kelly, and the typists who helped to meet the deadline, the writer expresses her appreciation.

To her parents, Elwood and Alta Mae Reber, for their loving support the writer is grateful.

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CHAPTER I

INTRODUCTION TO THE STUDY

What is creativity? Torrance, well-known for his research on this topic, describes creativity as a natural process in which human needs are involved.[1] The over-all need is to release tension created by a sense of disharmony or an awareness of incompleteness. To relieve tension, an individual begins to search for solutions, avoiding the commonplace and making guesses. These guesses, or hypotheses, are then tested, modified, and retested. The tension is finally relieved when a discovery is made and communicated to someone else. The end result of the creative process may be an abstract or concrete product, verbal or nonverbal.

The desire for education to produce a successful individual arouses an interest in creativity for,

> recent research findings indicate strongly that these goals (to produce fully functioning, mentally healthy, well-educated, vocationally successful individuals) are undeniably related to creativity.[2]

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[1] E. Paul Torrance, Torrance Tests of Creative Thinking, (Lexington, Mass.: Ginn and Co., 1974), p. 8.

[2] E. Paul Torrance, What Research Says to the Teacher-Creativity, National Education Association Series, no. 28, (Washington, D. C.: National Education Assoc., 1963), p. 3.

To teach in a creative way, to teach so as to increase creative abilities, is important in encouraging individuals to develop to their full potential.

Creative dance has become increasingly widespread as a method of introducing movement experiences; yet few studies have investigated changes occurring in creative thinking abilities as a result of participation in creative dance. One such study was conducted by Torrance, who found that the creative thinking ability of elementary school children improved significantly after instruction in creative movement.[1]

Rationale

Hearing impaired individuals, like other individuals, manifest creative behaviors. The creative thinking ability of hearing impaired and hearing persons has been studied and compared by a number of researchers. Studies of creativity by Johnson and Khatena and Singer and Lenahan showed that when verbal instruments, such as Onomatopoeia and Images, Interview, or "Tell a Story" techniques were used to assess creativity, deaf individuals

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[1]E. Paul Torrance, "Seven Guides to Creativity," Journal of Health, Physical Education, and Recreation 36 (April 1965): 26-27.

scored significantly lower than their hearing peers.[1] In contrast, when nonverbal instruments were used to measure creativity, it was found that deaf individuals scored approximately the same or higher than their peers.[2] Silver reported three studies of creativity, all of which revealed that deaf persons did not lag behind their normal peers when assessed by a nonverbal instrument.[3] The instrument most often used in research concerning creativity of the deaf was Torrance's Thinking Creatively With Pictures.

Wisher, based upon his experiences in teaching dance to deaf individuals at Gallaudet College, Washington, D.C., stated that,

> the deaf, assisted by the language of signs, seem to be more creative than their hearing peers and appear to reap greater benefits.[4]

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[1]Roger Johnson and Joe Khatena, "Comparative Study of Verbal Originality in Deaf and Hearing Children," Perceptual and Motor Skills 40 (April 1975): 631-635; Dorothy Singer and Mary Lenahan, "Imagination Content in Dreams of Deaf Children," American Annals of the Deaf 121 (Feb. 1976): 44-48.

[2]Henry Pang and Carol Horrocks, "An Exploratory Study of Creativity in Deaf Children," Perceptual and Motor Skills 27 (Dec. 1968): 844-846.

[3]Rawley Silver, "The Question of Imagination, Originality, and Abstract Thinking of Deaf Children," American Annals of the Deaf 122 (June 1977): 349-354.

[4]Peter R. Wisher, "Dance and the Deaf," in Encores for Dance, ed. Dennis J. Fallon (Washington, D. C.: American Allinace for Health, Physical Education, and Recreation, 1978), p. 176.

Wisher wrote several articles on the deaf, summarizing his empirical findings and perceptions, based upon approximately 30 years of teaching dance to deaf college women.[1]

Research studies involving deaf individuals participating in creative dance/movement sessions were not found. For that reason, the present study was undertaken. The intent was to help fill the void of experimental research on the development of creative abilities of hearing impaired individuals through the medium of dance.

Statement of the Problem

The problem of the study was to investigate changes in creative thinking and dance/movement skills of hearing impaired students, ages nine to fourteen years, in deaf education classes in selected public schools in Salt Lake City, Utah, after instruction in creative dance/movement. The experimental period was for 45 minutes daily, two times a week, for ten weeks. Subjects were

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[1] Peter R. Wisher, "Dance and the Deaf," Journal of Health, Physical Education, and Recreation 30 (Nov. 1959): 68-69; Peter R. Wisher, "Beat of a Different Drum," Gallaudet Today 1 (Spring 1971): 20-21; Peter R. Wisher, "Therapeutic Values of Dance Education for the Deaf," in Dance Therapy, ed. C. R. Mason (Washington, D.C.: American Alliance for Health Physical Education, and Recreation, 1974), pp. 71-72; Peter R. Wisher, "Dance for the Deaf," in Creative Arts for the Severely Handicapped, ed. Claudine Sherrill (Springfield, Ill.: Charles C. Thomas Publisher, 1979), pp. 105-110.

divided into a control and an experimental group, each comprised of 10 students. Creative thinking was measured by Torrance's Thinking Creatively With Pictures, Form B,[1] and dance/movement skills were measured by the Reber Dance/Movement Skills Assessment. A conclusion was drawn concerning the efficacy of creative dance/movement instruction in improving the creative thinking and dance/movement skills of hearing impaired students.

Definitions and/or Explanations

The following terms were defined as they specifically applied to the study:

Creative Dance/Movement

A review of the literature showed that creative dance/movement is defined in many ways;[2] however the overall goal is "to communicate through movement."[3] In this study the instructional sessions encompassed three

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[1] Torrance, Tests.

[2] Ruth L. Murray, Dance in Elementary Education, 3rd ed., (New York: Harper and Row, 1975); Elizabeth Sherbon, On the Count of One: Modern Dance Methods, 2nd ed., (Palo Alto, Calif.: Mayfield Publishing, 1975); Aileene Lockhart and Esther E. Pease, Modern Dance, 5th ed., (Dubuque, Iowa: Wm. C. Brown Co. Publishers, 1977).

[3] Mary Joyce, First Steps in Teaching Creative Dance, (Palo Alto, Calif.: Mayfield Publishing Co., 1973), p. 1.

broad areas: (1) basic movement skills, (2) sensitivity to movement with others, and (3) composition through structured improvisation. The teaching method involved presentation of material to elicit new movement experiences. A daily lesson outline may be found in the appendix.

Creativity

Torrance's explanation of creativity was chosen for this study since it applies to his test which was used as the data collection instrument in this study. He described creativity as:

> a process of becoming sensitive to problems, deficiencies, gaps in knowledge, missing elements, disharmonies, and so on; identifying the difficulty; searching for solutions, making guesses, or formulating hypotheses about the deficiencies: testing and retesting these hypotheses and possibly modifying and retesting them; and finally communicating the results.[1]

Thinking Creatively With Pictures, Form B

Torrance's Thinking Creatively With Pictures, Form B, was comprised of three 10 minute tasks. Picture Construction, the first task, involved a shaded jelly bean shape placed in the center of a page. Subjects were asked to draw a picture or an object, using the

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[1]Torrance, Tests, p. 8.

shape as part of their picture. This task was scored for originality and elaboration. The second task, Picture Completion, had 10 incomplete figures, in separate boxes, which the subjects were asked to complete by adding lines to. Each figure completed was evaluated for flexibility, fluency, originality, and elaboration. The last task, Circles, was a series of 40 circles out of which subjects were asked to create objects or pictures. The task was scored for fluency, flexibility, originality, and elaboration. A composite score was computed for an overall figural score.

Studies of the test-retest reliability of Torrance's Thinking Creatively With Pictures, Forms A and B, presented correlation coefficients ranging from .50 to .97. Coefficients were generally higher for fluency and flexibility than for originality and elaboration.[1]

Reber Dance/Movement Skills Assessment

This original test described in the appendix was

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[1]Torrance, Tests, pp. 19-20.

developed by the investigator to assess the ability of subjects to perform eight basic movement skills: Plié, relevé, leap, sauté, spinal roll-up, battement, 3/4 rhythm, and 4/4 rhythm. Each subject was rated individually on all skills by three raters on a five point scale. The lowest skill level was given a rating of 1; the highest skill level was given a rating of 5. The highest possible score was 40.

Hard of Hearing, Deaf, and Decibels

The deaf education administrators in Salt Lake City provided definitions related to hearing impairment. Hard of hearing was defined as, "those in whom the sense of hearing is non-functional for the ordinary purposes of life."[1] Hearing loss was stated in decibels (dB), which were defined as expressing "the extent to which one sound intensity is greater or less than another."[2] The Salt Lake School system used an audiology test to

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[1]Xerox material provided by Beverly Ashby, Salt Lake City School Administrator, Utah, Jan. 1980.

[2]Helmer R. Myklebust, The Psychology of Deafness (New York: Grune and Stratton, 1960), p. 22.

determine hearing loss which was evaluated on the following scale:

Degree of Handicap	Hearing Level dB 1964 ISO Reference *
none	-10 to 26 dB
slight	27 to 40 dB
mild	41 to 55 dB
moderate	56 to 70 dB
severe	71 to 90 dB
profound	91 or more

*1964 ISO - refers to the reference zero levels for pure tone audiometers recommended by the International Organization for Standardization, and which were put into use in 1964.[1]

Mode of Communication

Generally, students in the Utah schools were classified as either using oral or total communication. Communication with the oral communication students included the following: speech-reading, writing messages, gesturing/pantomiming, and demonstrating. Communication with the total communication students included signing exact English as well as all of the above.

Hypotheses of the Study

The hypotheses examined at the conclusion of the experiment were the following:

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[1]Xerox material provided by Beverly Ashby.

(1) there was no significant difference between the experimental group and the control group in creative thinking ability, and (2) there was no significant difference between the experimental group and the control group in dance/movement skills.

Limitations of the Study

The limitations of the study were as follows: (1) twenty hearing impaired students in deaf education classes in Salt Lake City area public schools; (2) degree to which the subjects were representative of the population from which they were drawn; (3) the physical aspects of the classrooms in which the dance sessions were conducted such as acoustics, floor condition, and amount of space; (4) cooperation of the staff and administration from the schools involved in the study; (5) validity, reliability, and objectivity of the Torrance's Thinking Creatively With Pictures, Form B, and the Reber Dance/Movement Skills Assessment; (6) the extent to which the following variables influenced the outcome of the study: hearing ability of the subjects, previous educational experience, achievement scores, and ability to communicate; (7) inability to control for Hawthorne effect; (8) agreement with the Salt Lake Administrators not to analyze data according to mode of

communication (oral versus total communication); and (9) computation of reliability coefficients and other statistics limited by small sample size, i.e., 10 in each group.

CHAPTER II

REVIEW OF RELATED LITERATURE

The studies reviewed in this chapter were described under the following subheadings: motor behavior of deaf children, development of tests of creativity, creativity studies with hearing subjects, creativity studies with hearing impaired subjects, and variables which may affect the study. The studies reviewed were summarized also in chart form at the end of the chapter.

Motor Behavior of Deaf Children

The studies by Long, Lehman, Morsh, Myklebust, Boyd, Carlson, Lindsey and O'Neal, Del Rey and Steiner and Pennella are reviewed in this section.[1] The studies

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[1]John A. Long, Motor Abilities of Deaf Children (New York: Teacher's College, Columbia University, 1932); Eugenie A. Lehmann, "A Study of Rhythms and Dancing for the Feebleminded, the Blind, and the Deaf," (MS thesis, Ohio State University, 1936): Joseph E. Morsh, "Motor Performance of the Deaf," Comparative Psychological Monographs Vol. 13 (Baltimore: John Hopkins Press, 1936); Helmer R. Myklebust, "Significance of Etiology in Motor Performance of Deaf Children With Special Reference to Meningitis," American Journal of Psychology 59 (Jan.-Oct. 1946): 249-258; John Boyd, "Comparison of Motor Behavior in Deaf and Hearing Boys," American Annals of the Deaf 112 (Sept. 1967): 598-605; B. Robert Carlson, "Assessment of Motor Abilities of Selected Deaf Children in Kansas," Perceptual and Motor Skills 34 (Feb. 1972): 303-305; Dianne Lindsey and Janet O'Neal, "Static and

included are those concerning motor evaluation of hearing impaired children.

Long,[1] in 1932, compared the motor abilities of deaf and hearing Jewish people, ages one to 28 years. Deaf subjects were 51 boys and 38 girls enrolled in the Institution for the Improved Instruction of Deaf Mutes in New York City. Hearing subjects were from the Hebrew Orphan Asylum in New York City, matched with the deaf subjects on age, sex, and race. The tests used were:

> (1) Brown Spool-Packing (Seashore-Tinker modification), for measuring speed in bimanual coordination; (2) Serial Discriminator, to measure speed of finger movements in discriminative reaction to a visual series; (3) Koerth Pursuit Rotor, for measuring eye-hand coordination in following a target moving in a circular path; (4) Tapping Key, for measuring speed of finger and forearm movement; (5) Miles Motility Rotor, for measuring speed in turning a small hand drill... (6) Smedley Hand Dynamometer, to give a simple measure of strength, and (7) Balancing Board, to yield a rough measure of sense of balance.[2]

Dynamic Balance Skills of Eight Year Old Deaf and Hearing Children," American Annals of the Deaf 121 (Feb. 1976): 49-55; Patricia Del Rey and Shelia Steiner, "Pursuit-Motor Performance of Deaf and Hearing Girls," Research Quarterly 47 (May 1976): 184-187; Lou Pennella, "Motor Ability and the Deaf: Research Implications," American Annals of the Deaf 124 (June 1979): 366-372.

[1]Long, Motor Abilities of Deaf Children.

[2]Ibid., p. 7-8.

The method of administering the tests, to avoid giving an advantage to either deaf or hearing students was to demonstrate, allow a trial attempt, and then test.

Statistical analysis involved computation of means, standard deviations, a Pearson Product-Moment Coefficient of correlation between sets of paired scores, and a t test of the difference between correlated means. The results showed that the deaf boys' scores were higher than those of the hearing boys in all tests except Serial Discriminator and Balancing Board. The hearing girls' scores were higher than those of the deaf girls' in all tests except Spool-packing, Tapping, and Motility Rotor. Long suggested that his findings be interpreted with caution since only three variables were controlled in the study and the sample size was small (on the same tests as few as 36 cases). The Balancing Board was the only test where the difference between the means of the deaf and hearing was statistically significant. Long concluded that neither group was superior as a whole; however, he observed,

> that deaf boys seem to be superior to hearing boys, and that deaf girls seem

to be inferior to hearing girls, in the motor abilities tested.[1]

Lehmann,[2] in 1936, investigated the value of rhythm and dancing for the feebleminded, the blind, and the deaf. Subjects were 12 girls, ages 10-15 years with intelligence quotients from 41-62, at the Institution for the Feebleminded of the State of Ohio; 11 girls, ages 12-15 years with intelligence quotients from 59-116, at the State School for the Blind in Ohio; and nine boys and girls, ages six to nine years, at the Ohio State School for the Deaf. Intelligence quotients were not available for the deaf subjects and were taken from the institution records on file for the other subjects. Assessment techniques used were the Yepsen Adjustment Test, a Rhythmic Skill Test, and a Dance Test.[3]

The Yepsen Adjustment test was used to evaluate the characteristics of the subjects under 11 headings: (1) attitude of others toward the subject, (2)

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[1]Ibid., p. 59.

[2]Lehmann, "A Study of Rhythms and Dancing."

[3]Yepsen's Adjustment Score Card, Ohio State University, Department of Psychology; Rhythmic Skill Test developed by investigator; Dance Test developed by Jesse B. Cameron, Annette Frechette, and Eugenia M. Lehmann at Battle Creek College, 1933.

sociability, (3) reliability in general, (4) subject's attitude toward superiors, (5) subject's language and language attitude, (6) attitude toward others, (7) activities, (8) industriousness, (9) work, (10) initiative, and (11) discipline. Scoring was done by subjective judgment based on observation by the investigator.

The Rhythmic Skill Test, scored on a four-point scale, included walk to 2/4, 3/4, 6/8, 4/4, and 5/4 rhythm; skip; waltz; gallop; run; leap; slide forward, sideward, and backward; reaction to music intensity and tempo; and coordination of walk, rated on a six point scale. The total score possible was 50.

The Dance Test assessed (1) creative ability by recording the number of fundamental rhythms used; (2) time pattern by recording whether or not a change in time occurred; (3) dramatic ability by recording the degree of impression to the observer; and (4) floor pattern by grading the complexity of the pattern used and the performance. The Dance Test was not administered to the deaf subjects because of inability to communicate instructions.

Results were presented in case study format, and a conclusion was drawn concerning the value of rhythms and dancing for each of the groups. Lehmann found that all

groups improved on the Yepsen Adjustment Test and the Rhythmic Skill Test. No improvement, overall, was found for groups on the Dance Test; however, a few individuals showed a skill increase. On the basis of her findings, Lehmann recommended that rhythms and dancing be incorporated in physical education classes for the feeble-minded, the blind, and the deaf.

Morsh,[1] in 1936, compared the motor performance of deaf and hearing subjects. The deaf subjects were 58 boys and girls, ages 11-20 years, from the elementary department of the Columbia Institution and from Gallaudet College. The hearing subjects (specifics not mentioned) were from public schools in the District of Columbia and subjects in previous experiments conducted by Morsh. The subjects were divided into "bright" and "dull" groups based on their scores on the Porteus Maze test, Goodenough Drawing test, and eight performance tasks from the Pintner-Paterson Performance Scale, given to subjects at Columbia Institution; the Stanford Achievement test, given to subjects at Gallaudet College; and an intelligence test (not specified) given to the hearing subjects. Assessment techniques used in the investigation were: the

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[1]Morsh, "Motor Performance."

Dunlap Double Tapping Plate,[1] the Dunlap Steadiness Tester,[2] the Dunlap Balancing Board,[3] a Location-Memory Test, a Speed of Eye-Movement Test,[4] and a Hand-Eye Coordination Test.[5]

Results indicated that on the tapping test deaf subjects showed more imbalance (error) than hearing subjects. No significant differences were found between sexes or between bright and dull groups. Performance was found to improve with age.

Deaf subjects were found superior on the steadiness test to hearing subjects and, overall, boys excelled over girls. No significant difference was found between bright and dull groups. Performance on the steadiness test improved with age.

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[1]Knight Dunlap, "Improved Forms of Steadiness Tester and Tapping Plate," Journal of Experimental Psychology 4 (May 1921): 430-433.

[2]Ibid.

[3]Earl L. Beebe, "Motor Learning of Children in Equilibrium in Relation to Nutrition," Genetic Psychological Monograph 15 (Dec. 1934): 95-244.

[4]Suggested by Dr. Harry M. Johnson of the American University.

[5]Buford Johnson, "Mental Growth of Children in Relation to Rate of Growth in Bodily Development," Bureau of Educational Experiment Report (New York: E.P. Dutton, and Co., 1925).

Deaf subjects excelled over hearing subjects on the balance test except when blindfolded. Performance of the boys exceeded that of the girls. No difference was found between bright and dull deaf subjects; however, bright hearing subjects surpassed dull hearing subjects. Performance improved with age up to nine years.

On the location memory test the deaf subjects confused the associated objects more frequently than the hearing subjects. Deaf girls excelled over all other groups, and hearing boys exceeded hearing girls. Performance of the bright subjects surpassed that of the dull subjects, and performance improved with age.

Performance of the hearing subjects was better than that of the deaf subjects on the speed of eye-movement test. Boys scored higher than girls and bright subjects out-performed dull subjects. Performance improved with age.

No difference was found between any groups on the hand-eye coordination test. Performance was found to improve with age and practice.

Myklebust,[1] in 1946, investigated the difference in motor ability, as measured by the Rail-Walking Test,[2]

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[1]Myklebust, "Significance of Etiology."

[2]Steven R. Heath, "Clinical Significance of Motor Defect, With Military Implications," American Journal of Psychology, 57 (Oct. 1944): 482-499.

of deaf children, ages eight to 21 years, classified etiologically. Subjects included 203 individuals from the New Jersey School for the Deaf and 71 from the South Dakota School for the Deaf, each classified in one of the following categories: endogenous, presumptively endogenous, exogenous, and undetermined. Data were collected on three trials for each of three rails: nine feet long by four inches wide, nine feet long by two inches wide, and six feet long by one inch wide.

Data were analyzed for effects of age, sex, and etiology, and special study was done in relation to meningitis. Scores of the subjects from the New Jersey School for the Deaf revealed a progression as a result of maturation. Comparison of the mean scores of motor ability for males and females from the New Jersey and South Dakota Schools showed a significant difference (15.29, CR=8.1). No significant difference was found when mean motor scores of etiological groups were compared. The meningitis group, when separated from the exogenous group, was found to be markedly inferior in motor performance compared to subjects deaf from other causes. Comparison of the two best adjusted and the two poorest adjusted meningitis cases, as selected by teachers familiar with the subjects, showed that the two best

adjusted had received more effective hospital treatment, were older at the age of onset, and that their motor skills were higher.

Myklebust concluded that etiological classification was desirable in order to deal more effectively with adjustment and learning problems of deaf children. He also indicated that maturational standardization of the Rail-Walking Test on normal children was needed in order to compare motor scores of normal and exceptional children.

Boyd,[1] in 1967, compared 90 deaf and 90 hearing boys, matched with regard to age, sex, and intelligence score, on motoric functions of static equilibrium, locomotor coordination, psychomotor integration, and laterality. Deaf subjects (hearing loss more than 65 dB) were drawn from day and residential schools for the deaf in Canada and the United States and classified in etiological groups of 30 boys each. In group A, deafness was pre or paranatal and exogenous. In group B, deafness was hereditary. In group C, deafness was exogenous postnatally. In the etiological groups there were 10 subjects in each of the age groups of eight, nine, and ten years. All subjects in the study had an intelligence quotient between 94 and 106

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[1]Boyd, "Comparison of Motor Behavior."

as measured by the Wechsler Intelligence Scale for Children; no subjects were accepted who appeared to have motor problems. The test battery consisted of items adapted from the Oseretsky Scale and the Van Der Lugt Psychomotor Series for Children (VDL).[1] Data were analyzed by the Kruskal-Wallace analysis of variance.

A significant difference ($p=.01$) was found, overall, between deaf and hearing subjects on the Oseretsky test for static sense of equilibrium. Comparison of subjects' scores with norms showed hearing subjects scored above the norms and deaf subjects scored about one year below the norm for their age group. No significant differences were found among etiological groups.

Results of the Oseretsky general dynamic test, measuring locomotor coordination, showed no significant difference between deaf and hearing eight-year-olds; however, nine-and-ten-year-old deaf subjects scored significantly lower than their hearing peers. All groups showed agreement with norms except the ten-year-old deaf group which showed two years retardation. No significant differences were found among etiological groups.

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[1]Earl A. Doll, The Oseretsky Tests of Motor Proficiency (Minneapolis: Minn.: The Educational Test Bureau, 1946); Maria J. A. Van Der Lugt, V.D.L. Psychomotor Test Series for Children (New York: N.Y. Univ., 1949).

Psychomotor integration was measured by three tests, VDL 3, VDL 7 and VDL 8, of kinesthetic control of force and memory, one test, VDL 4, of kinesthetic control of force, speed, aiming, and memory, and the Oseretsky speed of motor functioning test. No significant differences were found between deaf and hearing groups on any tests with the exception of VDL 4 where hearing boys surpassed deaf boys. Comparison of deaf and hearing boys' scores with norms showed both groups functioning above the norm on VDL 3 and VDL 7, both groups below the norm on VDL 8 and the Oseretsky test, and the hearing above and the deaf below the norm for VDL 4. Etiological group comparisons showed the endogenous group scored significantly higher on the Oseretsky test than the exogenous prenatal group, at the eight-and-ten-year-old level. No other differences were significant in etiological comparisons.

Laterality was discussed in terms of right or left hand preference in writing and left or right hand dominance as measured by the Oseretsky speed test. In the hearing and exogenous deaf groups, 16.7 percent was left handed, while 30 percent of the endogenous deaf was left handed. Analysis of the speed battery test indicated that the deaf did not develop as strong a dominance of one hand over the other as the hearing did. Etiological group

comparisons showed the endogenous group had a greater degree of dominance of right over left than the exogenous group.

Carlson,[1] in 1972, used the Brace Motor Ability Test[2] to assess the gross motor abilities of 48 residential students, mean age eight years two months, at the Kansas State School for the Deaf. The hearing level of the better ear ranged from 40-110 decibels. The subjects were divided into eight groups to facilitate handling and administration of tests. Two testers, who had received training in administration and scoring of the tests, were at each of the four stations established for motor ability testing. Subjects performed each stunt once, following a demonstration, and the score agreed on by the two testers was recorded.

Data were analyzed according to the effects of age, sex, and hearing loss. A t-test comparing means for all combinations of ages showed significant differences, at the .01 level, of 6.78 and 7.48 for five and six-year-olds compared to seven and ten-year-olds, respectively. Little

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[1]Carlson, "Assessment of Motor Ability."

[2]David K. Brace, Measuring Motor Ability (New York: Barnes, 1927).

difference was found in scores of boys and girls. No difference was found in performance when comparing children with hearing losses of 100, 80, and less than 80 decibels. Carlson concluded that balance and/or motor ability was not affected by intensity of hearing loss, age, or sex.

Lindsey and O'Neal,[1] in 1976, compared the static and dynamic performance of 31 eight-year-old deaf children with 65 decibel or greater hearing loss and 77 hearing children of the same age. The deaf subjects (mean intelligence quotient 96) were enrolled in one of two state residential schools in North Carolina. Hearing subjects (mean intelligence quotient 101) were public school third grade students from the same communities as the deaf. Subjects included both blacks and whites. Any child on medication, or with visual, physical, or obvious perceptual-motor deficiency, was excluded from the study; etiological classifications of the deaf subjects were not included because the diagnoses were not believed to be reliable.

All subjects were tested individually and given three attempts for each task on the test. The examiner and recorder were both physical therapists. The

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[1]Lindsey and O'Neal, "Static and Dynamic Balance."

interpreter was a teacher from each school who was familiar to the children. All 16 test items were selected from previously published test batteries used in motor evaluation of children. Items were selected and/or adapted from: the Oseretsky Tests of Motor Proficiency (ten items), the Meeting Street School Screening Test (one item), Cratty's work on perceptual-motor and balance activities (one item), Touwen's assessment of motor behavior (two items), and Seashore's balance beam test (one item).[1] The source of one item was not mentioned.

One-way analysis of variance, comparing deaf and hearing children in dynamic and static balance skills, showed that deaf children failed significantly ($p=.001$) more tests than hearing children on both static and dynamic tasks. The effect of elimination of visual input was investigated on two static balance tests. Elimination

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[1]Doll, The Oseretsky Tests; Paul K. Hainsworth and Mark L. Siqueland, Early Identification of Children With Learning Disabilities-The Meeting Street School Screening Test (Providence, RI,: Crippled Children and Adults of Rhode Island, 1969); Bryant J. Cratty, Developmental Sequence of Perceptual-Motor Tasks (Long Island: Educational Activities, 1967); B. C. L. Touwen and H. F. R. Prechtl, "Examination of the Child with Minor Nervous Dysfunction," Clinics in Developmental Medicine 38 (London: Spastic International Medical Publication, 1970); Harold G. Seashore, "The Development of a Beam-Walking Test and Its Use in Measuring Development of Balance in Children," Research Quarterly 18 (Dec. 1947): 246-259.

of visual input significantly decreased the time for all subjects, but more severely impaired the deaf children's performance.

A three-way analysis of variance, explored the relationship between race, sex, and hearing status and performance of dynamic and static balance skills. Results showed significance (p=.01) between hearing status and the performance of subjects on both grouped static and dynamic balance tests. No significant effects were found for race or sex on either grouped static or dynamic balance skills or individual test items. Chi-square analysis was performed on all data examined by analysis of variance, and the same conclusions were derived. Lindsey and O'Neal concluded that: (1) deaf eight-year-old children show deficient abilities in static and dynamic skills, and (2) there are no significant main effects for race or sex on the performance of static or dynamic balance skills of eight-year-old children.

Del Rey and Steiner,[1] in 1976, investigated the pursuit-motor performance of 30 deaf and 30 hearing girls. Subjects were divided into three age groups: seven years,

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[1]Del Rey and Steiner, "Pursuit-Motor Performance."

nine years, and eleven years. Deaf was defined as loss of hearing before language development and mean hearing loss of at least 82 dB.

A pursuit-rotor was used to assess pursuit-motor performance. The task required the subject to contact a beam of light, traveling in a circular pattern, with a stylus. The stylus contained a photoelectric cell which allowed the cumulative contact time to be recorded. The beam of light was set at 30, 40, and 50 revolutions per minute. Each subject had four trials (15 seconds each) at each speed.

Statistical analysis involved a three-way analysis of variance with repeated measures on the last factor (speed). Age, level of hearing, and target speed were independent variables. The hypothesis that the deaf subjects would have greater time on target score than the hearing subjects was not supported. Significant at the .01 level, the eleven-year-olds (hearing and deaf) had higher scores than the seven-year-olds (hearing and deaf). All target speeds were significantly different (p=.01) from each other for all subjects.

Pennella[1] discussed the implications of past research

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[1]Pennella, "Research Implications."

conducted concerning motor ability of the deaf. The review of literature encompassed the importance of balance in motor ability, the effect of etiology on motor performance, the rationale for programs of motor improvement, and specific studies concerning motor performance of the deaf. Results of these indicated a need for improved physical education programs for the deaf designed to emphasize balance, equilibrium and kinesthetic skills.

Pennella stressed that implementation of a physical education program involves appropriate assessment techniques. Tests recommended by Pennella included (1) Scott's adaptation of the Bass Stick test, (2) Fleishman's Rail-walking test, (3) Johnson's Progressive Inverted Balance test, and (4) AAHPER motor fitness test.

The suggested methodology involved a daily participant oriented program using training stations. The physical education program, Pennella stated, should be progressive, beginning at the preschool level and continuing through all grades. In addition to tumbling and gymnastics, the following stations were suggested: trampoline, mini-trampoline and landing mat, low and high balance beams of various lengths, low and high parallel bars, front and side scale, balance boards, Bass' Stepping Stones test, Cratty's Dynamic test, and Cureton's Equilibrium Spinning test.

Development of Tests of Creativity

The studies by Guilford, Withers, Wyrick, Barabasz Torrance and Aliotti, Glover, Halpin and Halpin, Torrance, and Dodds were reviewed in this section.[1] Studies were chosen for inclusion on the basis that they involved development of tests for measuring creativity.

Guilford[2] investigated the nature of abilities involved in creative thinking. The first stage of the investigation involved developing hypotheses and preparing

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[1] J. P. Guilford, et al., "A Factor-Analytic Study of Creative Thinking, II. Administration of Tests and Analysis of Results," Reports from the Psychological Laboratory no. 4 (Los Angeles: University of Southern California, 1951); Maida Rust Withers, "Measuring the Creativity of Modern Dancers," (MS thesis, University of Utah, 1960); Waneen Wyrick, "The Development of a Test of Motor Creativity," Research Quarterly 39 (Oct. 1968): 756-765; Arreed F. Barabasz, "Test-Retest Reliability of the Torrance Tests of Creative Thinking, and the Relationship Between Intelligence and Figural Creativity," Child Study Center Bulletin 5 (Sept.-Nov. 1969) 73-74; E. Paul Torrance and Nicholas C. Aliotti, "Sex Differences in Levels of Performance and Test-Retest Reliability on the Torrance Tests of Creative Thinking Ability," Journal of Creative Behavior 3 (Winter 1969): 52-57; Elizabeth Glover, "A Motor Creativity Test for College Women," (Ph.D. dissertation, University of North Carolina, 1974); Gerald Halpin and Glennelle Halpin, "Can Self-Trained Scorers Reliably Score the Torrance Tests of Creative Thinking?" Psychology in the Schools 11 (Jan. 1974): 56-58; Torrance, Tests, p. 62-63; Patt Dodds, "Creativity in Movement: Models for Analysis," Journal of Creative Behavior 12 (Fourth Quarter 1978): 265-273.

[2] J. P. Guilford, et al., "A Factor-Analytic Study of Creative Thinking, I. Hypotheses and Description of Tests," Reports from the Psychological Laboratory no. 4, (Los Angeles: University of Southern California, 1951).

tests to examine the hypotheses. Evaluations were made on the first set of tests, and new tests were constructed or adapted to evaluate the hypotheses and sub-hypotheses. The eight abilities and the sub-abilities thought to be involved in creative thinking were: (1) sensitivity to problems (seeing defects, seeing the unusual, seeing what needs to be done); (2) fluency (simple restrictions and limited potential, simple restrictions and large potential, complex restrictions and limited potential, complex restrictions and large potential); (3) flexibility (adaptability to changing instructions, freedom from inertia of thought, spontaneous shifting of set); (4) originality (uncommoness of responses, unconventional associations, cleverness); (5) penetration (remote associations); (6) analysis (perceptual analysis of perceived objects, conceptual analysis of verbal material); (7) synthesis (production of perceived objects, production of conceptual objects, production of logical or meaningful order); and redefinition (perceptual reorganization, shift of function, moving part from one whole to another).[1]

The last stage of the investigation[2] involved

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[1]Guilford, et al., "Factor Analytic Study II."

[2]Ibid., p. 3-24.

administration of 31 experimental tests and 12 reference tests to evaluate the hypothesized abilities and scoring procedures. The battery of tests was administered to 411 Air Cadets and Student Officers at four Air Force bases. Each test was hand-scored by two individuals. More than one ability score was obtained for each test where feasible. The total number of different scores derived was 64. Statistical analysis of the scores was voluminous, and only selected findings are reviewed here.

Factors which affected performance on the tests were: "verbal comprehension, numerical facility, perceptual speed, visualization, and general reasoning."[1] Based upon the factor analysis findings, Guilford concluded that the following abilities and sub-abilities comprised creative thinking: (1) sensitivity to problems (ability to see defects), (2) word fluency (complex restrictions and limited potential), (3) associational fluency (simple restrictions and limited potential), (4) ideational fluency (simple restrictions and large potential and complex restrictions and large potential), (5) adaptive flexibility (adaptability to changing instructions and freedom from inertia of thought), (6) spontaneous flexibility

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[1]Ibid., p. 19

(spontaneous shifting of set), (7) originality (uncommoness of responses, unconventional associations, and cleverness), (8) closure (production of perceived objects), and (9) redefinition (shift of function).

Withers[1] investigated the feasibility of measuring the creative ability of modern dancers on instruments devised for measuring creativity in other arts and sciences. Subjects were four men and seven women, junior and senior dance majors and minors, attending a three-week dance workshop at the University of Utah in the summer of 1960. The seven written tasks were obtained from the University of Utah Psychological Research Department and selected on the basis that the same factors they evaluated could be measured or judged in dance performance tasks. The written tests used were: Apparatus (suggesting improvements of implements), Hidden Figures (identifying one of five figures in a complex geometrical design), Pertinent Questions (writing questions, which when answered, would solve given conflict situations), Plot Titles (writing appropriate titles for given story plots), Similies I (writing ideas for similies to complete a given statement), Social Institutions (suggesting improvements for given

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[1]Withers, "Measuring Creativity."

social institutions or customs), and Topics IF (writing ideas about a given topic). The factors measured by the seven tests were: sensitivity to problems, figural redefinition, conceptual foresight, originality, associational fluency, penetration, and ideational fluency.

Withers devised three movement tasks which could be evaluated in terms of seven criteria. The performance tasks involved composing a two minute dance based on one of several Haiku poems, composing a 16 count movement phrase using technically new and difficult movement, and improvising movement after visual stimulus. The movement performances were rated, by four judges using a nine-point scale, on over-all creativity, sensitivity to the problem, originality, conceptual unity, penetration, appropriateness, and technique. Agreement between judges on ratings was significant at the .05 level.

Statistical analysis involved computation of correlation coefficients between the seven written tests and the three movement tasks. Significant coefficients were found when correlating the Plot Titles test with the originality score on the Haiku/movement task (.780) and the total originality score from all three movement tasks (.789). When over-all creativity and technique

ratings were correlated, a significant coefficient (.714) was found for the improvisation task, and coefficients significant at the .01 level were found for the 16 count movement phrase task (.932) and the combined total for all three movement tasks (.919). Withers concluded that it was possible to measure the creative ability of dancers on instruments devised to predict creativity in other arts and sciences.

Wyrick[1] developed a test of motor creativity for college women that differentiated individual ability to produce number and uniqueness of motor responses in problem solving. Subjects involved in development of the test were 25 college women enrolled in a 1965 summer school class at the University of Texas. The test battery involved four test items for each of four motivators: ball-wall, hoop, parallel lines, and beam. Two test items for each motivator were administered in a one hour session on one day (day I test) and alternate forms of the items were administered at the identical time the following day (day II test). All tests were individually administered by the investigator over a three-week period.

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[1]Wyrick, "Development of a Test."

Wyrick discussed validity and reliability of the test battery administered. Face validity was claimed. Reliability was investigated two ways: (1) equivalent forms and (2) internal consistency. The reliability which resulted from the equivalent forms method was .92. The coefficients of internal consistency of items scored for motor originality (.87), motor creativity (.92), and motor fluency (.93) were significant at the .01 level.

Only day I data were considered in the final phase of test selection because day I items yielded lower inter-correlations as well as higher correlations with the criterion and day I data considered alone eliminated variances attributable to temporary changes in motivation, health, or emotional tension of the subject. A multiple regression technique performed on the eight day I items indicated the best possible combination of items for predicting total scores.

A motor fluency, motor originality, and motor creativity score were computed for each item on the day I test. The sum of the responses for each subject on each item was the motor fluency score. The motor originality score involved the frequency with which each response occurred within the total sample for each day. Responses occurring once were awarded two points, and those occurring

twice were awarded one point. Motor fluency and motor originality scores were changed to standard scores and then averaged to compute the motor creativity score.

Based on the multiple regression analysis, Wyrick recommended two items for assessment of motor originality; four for motor fluency; and four for motor creativity. Because of scoring difficulty, test objectivity, and problems of administration, the test was considered unsuitable for classroom use; however, it was suggested as an instrument for researchers investigating the relationships of motor creativity to other human attributes.

Barabasz[1] investigated the test-retest reliability of the figural forms of Torrance's Test of Creative Thinking and the relationship between intelligence scores and composite figural scores. Subjects were 41 children, ages seven to eight years, enrolled in Campus School at the State University College at Buffalo. The Stanford-Binet Intelligence Scale and the Torrance's Thinking Creatively With Pictures, Forms A and B, were administered at the end of the second grade school year. The Torrance tests were administered again six months later.

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[1]Barabasz, "Test-Retest Reliability."

Pearson correlation coefficients were computed for each factor in the Torrance tests to determine test-retest reliability. Coefficients for fluency (.43), flexibility (.77), elaboration (.60), and composite score (.53) were significant at the .01 level; the originality coefficient (.04) was not significant.

A Pearson Product Moment correlation coefficient was calculated to determine the relationship between the Stanford-Binet scores and the composite figural score. Results yielded a coefficient (.35) significant at the .05 level.

Torrance and Aliotti[1] investigated the level of functioning and stability, in relation to sex differences, of the Torrance Tests of Creative Thinking. The figural and verbal forms of the test were administered one week apart to 59 girls and 59 boys in the fifth grade. The tests were scored according to published guides for fluency, flexibility, originality, and elaboration; scores were then converted to T-scores.[2]

Results showed that Forms A and B were consistent and that the figural and verbal forms functioned the same. For

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[1]Torrance and Aliotti, "Sex Differences."

[2]Torrance, Tests (for figural and verbal forms.)

the figural tests, significant differences were found showing males superior to females on originality and showing females superior to males on elaboration. Test-retest reliability coefficients ranged from .61 for figural fluency to .94 for verbal fluency. Overall, a small tendency was noted for the scores of males to remain more stable over time than the scores of females.

The fifth grade level was chosen for investigation of sex differences in creative ability since sex identifications seem to emerge at this age. Few sex differences have been found, in the United States, below the fourth grade.[1] Torrance and Aliotti concluded that sex role identification and its influence on creative development warranted further study.

Glover[1] developed a test for measuring motor creativity based on the figural form of Torrance's Test of Creative Thinking. Creativity was defined as,

> a complex process whereby a person senses a problem, identifies the difficulty, searches for a solution, reinterprets the solution and produces a new product.[3]

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[1]Torrance and Aliotti, "Sex Differences," p. 52.

[2]Glover, "Motor Creativity Test."

[3]Ibid., p. 79.

Movement tasks were designed which would encourage the use of gross movement, arouse a desire to organize new movement patterns in response to stimuli, and stimulate new and different ways of moving. Move to Sounds, Move with Ball, Move with Hoop, and Move with Rope, group 1 tasks, allowed the subject to relate to a stimulus and explore novel movements of the body in space; this group of activities was considered analogous to the picture construction drawing task in Torrance's Test of Creative Thinking. Obstacle Course, Boxes, See and Move (objects), and See and Move (subjects), group 2 tasks, were designed to correspond to Torrance's incomplete figures drawing task, allowing the subject to move freely in relating to a stimulus while placing a limitation on exploration by requiring some organization in the movement response. In Hoops and Lines, Ropes, Hoops, and Beams, group 3 tasks, the subject was repeatedly exposed to traditional stimuli which limited the freedom to move creatively. This group of activities was considered analogous to the repeated figures drawing task.

Exploratory studies were conducted in the fall of 1972 to investigate what time limits were appropriate for the tasks, to obtain videotape recordings of the tasks, to explore the feasibility of videotaping and evaluating

several subjects simultaneously, and to investigate the subjects' ability to perform alone and with others. In a pilot study to explore the appropriate time limits, two tasks were randomly drawn from each of three groups. Four subjects were then randomly exposed to the six tasks, in time limits of one, two, or three minutes. A questionnaire was filled out by each subject after each task was completed. Analysis of the responses resulted in assignment of a three minute limit to group 1 and 2 tasks and a one minute limit to group 3 tasks.

In a second exploratory study with 12 subjects, two variables were investigated: the order of tasks and the number of subjects performing simultaneously. Subjects filled out a questionnaire following completion of each task. Results of the questionnaire indicated that subjects preferred to perform tasks with at least one other person; however the camera was unable to follow more than one subject at a time and it appeared that some subjects relied on others when creating new movements. The subjects were therefore tested individually in the final study. The exploratory studies allowed Glover to identify movement characteristics and evaluate them in terms of creativity aspects of fluency, originality, flexibility and elaboration.

In the winter of 1972 Glover conducted a pilot study in order to select three tasks out of the 12 to measure motor creativity in the final study and to obtain videotape recordings for training judges in movement evaluation. Subjects were 12 women enrolled in the University of Oregon physical education program. Each subject was tested individually. Results of the pilot study allowed the investigator to finalize the scoring procedure and select three tasks based on established criteria. The most valid task out of group 1 appeared to be Move to Sounds; out of group 2, See and Move (subjects); and out of group 3, Hoops and Lines.

In the final study the three movement tasks were administered to 25 randomly selected women enrolled in physical education service courses at the University of Oregon, in the spring of 1972. The tasks were presented four times to each subject within two weeks. The first testing session was used to acquaint the subject with the procedure and the other three were used for evaluation purposes. Three judges were trained with data from the pilot study before they assessed the movement performance of subjects during their second testing session. The three judges evaluated these data twice and one judge, the investigator, evaluated the performance of the subjects in the third and

fourth testing sessions. Evaluations from the second and third testing sessions were combined to obtain one set of scores. Evaluations from the second, third, and fourth testing sessions were combined to obtain another set of scores.

The objectivity of the test was analyzed by computing Pearson Product correlations. Correlation coefficients for objectivity indicated inconsistent evaluation, in all three tasks, of originality, non-locomotor movements, body parts, and tempo changes. In Move to Sounds low coefficients were found for fluency (.20), flexibility (.17) and locomotor movements (.15), and in Hoops and Lines, for fluency (.24).

Reliability of the test was analyzed by subjecting data to Pearson Product Moment correlations. Results of reliability analysis showed that the longer time limit of Move to Sounds interfered with consistent evaluations by the judges. Reliability correlation coefficients indicated that judges were inconsistent in evaluating three variables for Move to Sounds and for See and Move, and one variable for Hoops and Lines.

Validity of the motor creativity test was claimed based on the figural form of Torrance's Tests of Creative Thinking. Glover concluded that the motor creativity test should be used with caution until further refinement of scoring procedures.

Halpin and Halpin,[1] in 1974, investigated the extent of agreement between self-trained scorers and a scorer trained by Torrance on the Torrance Tests of Creative Thinking. The self-trained scorers received no training other than individual study of the scoring guides. The interscorer reliability for the Torrance trained scorer and other professionally trained scorers was consistently above .90 with almost no difference in means. The Torrance Tests of Creative Thinking, Verbal and Figural Forms B, were administered to 164 female and 65 male university students. From these, 15 verbal and 15 figural test booklets were selected randomly and scored by the three scorers.

Interscorer agreement on verbal and figural fluency, flexibility, originality, and figural elaboration scores was determined by analysis of variance.[2] Interscorer reliability was above .90 for all seven creativity measures for the three scorers. The difference between means was analyzed also. A significant difference in means for the three scorers was found on verbal fluency,

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[1]Halpin and Halpin, "Self-Trained Scorers."

[2]Ron L. Ebel, "Estimation of the Reliability of Ratings," Psychometrika 16 (May 1951): 407-424.

verbal originality, figural fluency, and figural elaboration scores. A multiple comparison[1] showed that the self-trained scorers scored verbal fluency significantly lower than the Torrance trained scorer. Determining whether or not highly unique responses were relevant caused one self-trained scorer to vary significantly from the professionally trained scorer on verbal originality. One of the self-trained scorers was significantly different in figural fluency from the professionally trained scorer. The investigators believed this difference was not of practical significance. The difference between self-trained scorers and the professionally trained scorer on figural elaboration occurred because the former failed to give credit for subtle forms of elaboration. Halpin and Halpin concluded that self-trained scorers can score the tests reliably with individual study of the scoring guides.

Torrance[2] described the development and history of the Torrance Tests of Creative Thinking. The original battery of tests was developed in 1958 as part of a research program on the education of gifted children. The tests were adapted

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[1]J. W. Tukey, "Comparing Individual Means in the Analysis of Variance," Biometrics 5 (Feb. 1949): 99-114.

[2]Torrance, Tests.

from instruments developed by Torrance for a survival training research program as well as from instruments developed by Guilford, Barron, and other investigators. The tests were designed for use with age groups from pre-school through graduate school. These were pilot tested in 1958. The tests which appeared most promising were work sample types involving inventiveness, fun, and "built-in" motivation, and to which all age groups responded positively. These tests could be quantified according to Guilford's qualities of fluency, flexibility, originality, and elaboration.

Along with other researchers, Torrance continued the research: refining, modifying, collecting data for norms, and assessing reliability and validity of the tests. In the 1974 revision of the Norms-Technical Manual, the norms were established by grade level.

Dodds[1] presented movement definitions for the cognitive creativity factors described by Guilford and a behavioral model for describing movement responses in order

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[1]Dodds, "Creativity in Movement."

to interpret the creativity factors. The creativity factors discussed were fluency, flexibility, originality, and elaboration. Movement fluency was defined as the total number of discrete movement responses. Movement flexibility was the number of different categories of movement responses. Movement originality was described as new and unique movement responses. Movement elaboration was defined as the variations of one movement response.

A three-step model was presented which allowed single movement responses to be analyzed and categorized on the three levels simultaneously. Basic movement elements, fundamental movement patterns, and specialized movement skills comprised the three-step model.

Basic movement elements were described in the framework developed by Laban. In it, movements occurred in four dimensions: (1) space (where the body moves), (2) time (speed of body movement), (3) force (energy used in movement), and (4) flow (amount of control used).

Fundamental movement patterns were divided into three areas: locomotion, nonlocomotion, and manipulation. The third step, specialized movement skills, referred to the characteristic movement patterns unique to a sport or movement form.

Creativity Studies With Hearing Subjects

Research by Fleming and Weintraub, Stroup and Pielstick, Torrance and Hansen, Phillip, and Martinson and Seagoe are reviewed in this section.[1] Studies included were limited to those involving hearing subjects and tests of creativity.

Fleming and Weintraub,[2] in 1962, conducted an exploratory study to investigate the relationship between verbal and nonverbal creativity and the rigidity aspect of personality. Subjects were 68 children, who had completed grade 3, 4, 5 or 6 and who were enrolled in a summer school for the academically talented. Subjects, ages 8 to 12.5 years, were selected on the basis of teacher recommendation, intelligence scores, and achievement data if available. Subjects were

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[1]Elyse S. Fleming and Samuel Weintraub, "Attitudinal Rigidity as a Measure of Creativity in Gifted Children," Journal of Educational Psychology 53 (April 1962): 81-85; F. Stroup and N. L. Pielstick, "Motor Ability and Creativity," Perceptual and Motor Skills 20 (Jan. 1965): 76-78; E. Paul Torrance and Ethel Hansen, "The Question-Asking Behavior of Highly Creative and Less Creative Basic Business Teachers Identified by a Paper-and-Pencil Test," Psychological Reports 17 (Dec. 1965): 815-818; Joan A. Philipp, "Comparison of Motor Creativity with Figural and Verbal Creativity, and Selected Motor Skills," Research Quarterly 40 (March 1969): 163-173; Ruth A. Martinson and May V. Seagoe, The Abilities of Young Children (Council for Exceptional Children Research Monograph, 1977): 1-60.

[2]Fleming and Weintraub, "Attitudinal Rigidity."

tested on six verbal tasks: Impossibilities, Consequences, Situations, Unusual Uses, Common Problems and Improvements and three nonverbal tasks: Picture Construction, Incomplete Figures, and Circles. Attitudinal rigidity was measured by the Modified Revised California Inventory. Tests were administered over three weeks by classroom teachers.

Creativity tests were scored for ideational fluency, spontaneous flexibility and originality. Results showed a negative correlation (-.41) between verbal creativity and attitudinal rigidity significant at the .01 level. Verbal and nonverbal creativity were correlated (.53) significant at the .01 level. No significant relationship was found between nonverbal creativity and rigidity or age or sex and verbal or nonverbal creativity. Fleming and Weintraub concluded that the aspects of personality and attitudinal rigidity warrant further investigation in their relationship to creativity.

Stroup and Pielstick,[1] in 1965, investigated the hypothesis that a portion of the variance in creativity measure might be accounted for, or at least associated with, motor skills. Data were collected on 97 sixth grade boys in public elementary schools of middle or lower-

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[1]Stroup and Pielstick, "Motor Ability and Creativity."

middle class neighborhoods. Scores for fluency, flexibility, originality, and elaboration were derived from Torrance's Test of Creativity.[1] McCloy's Iowa Revision of the Brace Test was administered to measure motor ability.[2] The battery of creative tests was administered in a single session in regular classroom groups; the motor ability test was administered one year later to groups of boys ranging in number from 13-23.

Product-Moment correlations were computed between the motor ability scores and each of the creativity scores. None of the values reached the .05 level of significance. The findings indicated that the characteristics of motor ability and creativity were independent of each other.

Torrance and Hansen,[3] in 1965, investigated the types of questions asked by "more creative" and "less

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[1]E. Paul Torrance, et al., Assessing the Creative Thinking Abilities of Children (Minneapolis: Bureau of Educational Research, University of Minnesota, 1960).

[2]C. H. McCloy, "An Analytical Study of the Stunt Type Test as a Measure of Motor Educability," Research Quarterly 8 (Oct. 1937), pp. 60-67; Brace, Measuring Motor Ability.

[3]Torrance and Hansen, "Question-Asking Behavior."

creative" ninth and tenth grade basic business teachers. The Torrance Test of Imagination, Form DX,[1] was administered to 29 teachers and scored for fluency, flexibility, and originality by experienced scorers under the supervision of Torrance. The six highest and six lowest scoring teachers were identified on the basis of total raw scores. The classes of the 12 teachers were observed five times, randomly selected over a semester, by two observers who were not informed whether the teachers were in the high or low creativity group. Observer reliability was established in a separate investigation.[2] Observations were made at the end of every 30 seconds for each class period, and a record was made of the questions asked.

Based on Divergent Power,[3] scores were assigned to each question. The mean score for the highly creative teachers was 58.83, significantly higher than the mean of

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[1]Torrance Test of Imagination, Form DX, includes items from Torrance's Tests of Creativity: Product Improvement, Unusual Uses, Unusual Uses of Tin Cans, Ask-And-Guess, and Circles.

[2]Ethel Hansen, "A Comparison of the Teaching Behaviors of Highly Creative and Less Creative Basic Business Teachers," (Ph.D. dissertation, Univ. of Minnesota, 1965).

[3]Robert C. Burkhart and Gary Burnheim, Object Question Manual (University Park, PA.: Department of Art Education Research, Penn. State University, 1963).

2.[illegible] for the less creative teachers. The percent of factual questions asked by the less creative teachers (76.13) was significantly higher than that for the highly creative teachers (36.67). The percent of divergent questions asked by the high creative teachers (10.91) was significantly higher than that for the less creative teachers (.82). Torrance and Hansen concluded that the question-asking behavior of the two groups of basic business teachers varied markedly.

Philipp[1] investigated the relationship between verbal, figural, and motor creativity and relationships between motor skills, height, weight, and intelligence, and motor creativity of fourth grade children. The subjects were 65 students with a mean age of 10 years enrolled in two fourth grade classes in upper-middle-class schools. Assessment techniques employed were: Torrance's Tests of Creative Thinking, Verbal and Figural Forms A; Wyrick's Motor Creativity Test; a hand grip dynamometer; standing broad jump; one foot balance on a stick; and zig-zag run. Lorge Thorndike intelligence scores, ages, heights, and weights were recorded.

A correlation matrix was developed to show the relationship between each pair of variables. Results

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[1]Philipp, "Comparison of Creativity."

indicated high intercorrelations between verbal and figural creativity. No significant relationships were found between motor creativity and any motor skills, intelligence score, age, or size.

A t-test was used to determine differences between means. Results indicated no real differences between boys and girls of the same age on creativity measures. Significant differences were found for balance, grip strength, broad jump, and zig-zag run, indicating higher performance by boys on measures of strength and higher performances by girls on measures of agility and balance. Using motor creativity as the dependent variable and each of the other variables as independent variables, stepwise multiple correlations and regression analysis showed no significant values for boys and girls together for combinations of variables to predict motor creativity.

Considering boys and girls separately, results showed significant values. Weight, figural fluency, and figural originality were found to be the best combinations for predicting motor creativity of boys, while verbal originality, figural fluency, and flexibility were found to be the best combinations for predicting motor creativity of girls. Philipp concluded that the findings suggested girls were more generalized in creativity

while boys were more specific in creativity.

Martinson and Seagoe,[1] in 1977, studied the relationship between mental ability, performance on creativity tests, and selected products of 106 children enrolled in five ungraded classes at the University Elementary School at the University of California at Los Angeles during the spring semester of 1964. Chronological ages of the subjects corresponded with those normally found in grades three through six. Subjects were from the middle and upper middle socioeconomic classes, had developed written communication skills, and had 1960 revision Binet intelligence test results. Several children, recommended by classroom teachers for assistance, were allowed tape recorded interviews as a substitution for written work. The subjects were divided into two groups, the high (H) group having intelligence scores of 130-170 (mean 142.7), and the low (L) group having intelligence scores of 86-119 (mean 107.5). Children with intelligence scores between 120-129 were excluded in order to study two populations with a clear differentiation in ability.

The areas in which subjects provided products included science (proposing solutions for two problems

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[1]Martinson and Seagoe, Abilities of Young Children.

related to travel and communication on the moon); creative writing (composing a poem and a written story titled "It Couldn't Happen"); social studies (writing an essay titled "My Idea of Utopia" and an essay on survival when stranded on an island); art (producing paintings and clay models); and rhythms (responding through movement to music played). The Guilford tests of Match Problems II, Associations, Utility, and Consequences were administered to all subjects. In each area three judges, considered expert in the field, rated the products. Products were rated, on the basis of total group performance within age category, on originality and effectiveness of expression on a nine-point scale.

Martinson and Seagoe found no significant differences, on the Guilford tests, between H and L group performance with the exception of Association where the differences were significant at the .05 level. The investigators suggested the performance of the H group was better possibly because of good vocabulary.

Interjudge reliability coefficients for products ranged from .14 (poem) to .95 (clay). Ratings were done independently by judges who were not specifically trained; however an effort was made to clarify the meaning of the

terms originality and effectiveness of expression. The ratings for originality and effectiveness of expression were combined into a mean rating. The mean ratings of the three judges were then combined into mean product ratings. The product ratings were then divided into high and low groups.

Chi-square analysis showed significance at the .05 level on evaluation of the poem, in favor of the H group. Significance at the .01 level, in favor of the H group, was found in evaluation of the stories "It Couldn't Happen" and "My Idea of Utopia," the science problems solutions, and the rhythms performances. No significant differences were found in the other areas.

Teachers of the participating class groups were asked to name the five most creative and the five least creative students in their classes. When the teacher ratings were compared with a high or low rating assigned on the basis of a total mean product rating score, it was found that the teachers accurately selected 75 percent of the children with low ratings and 54 percent of the children with high ratings on products.

Martinson and Seagoe concluded that, although the study did not show that intelligence correlates positively with creativity, qualitative excellence in products

related positively to high intelligence. Many attributes and abilities that are elements in creativity were possessed by mentally gifted children.

Creativity Studies With Hearing Impaired Subjects

Research by Lampard, Silver, Pang and Horrocks, Johnson and Khatena, Singer and Lenahan, and Kaltsounis was reviewed in this section.[1] Studies included were those involving hearing impaired subjects and tests of creativity.

Lampard,[2] in 1960, studied the differences between paintings done by deaf children and paintings done by hearing children. Paintings by 20 deaf children, enrolled at the Clarke School for the Deaf in Northampton, were collected over a period of six years beginning with their entry into the school at age four years. A summary

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[1]Marie T. Lampard, "The Art Work of Deaf Children," American Annals of the Deaf 105 (Nov. 1960): 419-423; Rawley A. Silver, Developing Cognitive and Creative Skills Through Art (Baltimore: University Press, 1978); Pang and Horrocks, "Exploratory Study;" Johnson and Khatena, "Comparative Study;" Singer and Lenahan, "Imagination Content;" Bill Kaltsounis, "Differences in Creative Thinking of Black and White Deaf Children," Perceptual and Motor Skills 32 (Dec. 1971): 243-248.

[2]Lampard, "The Art Work."

description was written based on the deaf children's paintings relation to shape, color, line, composition, technique, and subject matter. Lampard's report focused on technique and subject matter since these were the areas in which differences occurred.

In technique, the skill of handling the medium, the group of deaf children, as a whole, was found to be somewhat behind an average group of hearing children of the same age. The manner of work, for the most part, was found to be fast, impatient, and careless with little involvement and interest. A slow, painstaking, and rigid manner of work was occasionally observed. The amount of subject matter in paintings by deaf children was found to be considerably less than the amount found in paintings by hearing children of the same age. Paintings by deaf children were found to be non-objective and schematic, with little interaction or action between the few people or animals depicted and seemingly, no desire to tell a story or comment on the world. A basic shape which was painted again and again over an extended period of time, adapted to different subject matter, was found in the paintings of 11 deaf children.

Lampard concluded that a test instrument needed to be devised to assess informational content of children's

art work. On the basis of the study, she indicated that art could be used as an indicator of a problem as well as a means of providing meaningful experiences and a language for communication.

Silver,[1] in 1966, investigated the following hypotheses: (1) deafness impedes development of creative skills; (2) unfavorable comparisons between deaf and hearing students may be reduced or eliminated by the approach to teaching art; and (3) art teachers can simultaneously stimulate communication, cognition, adjustment, and the objectives of art education. Experimental art classes were taught one hour a week for eleven weeks at three schools for deaf children and a school for language and hearing impaired children. The 25 subjects, ages 8-17 years, were selected by administrators of their schools for participation. Thirteen were deaf and 12 were diagnosed as aphasic. Drawing and painting were done from imagination with the exception of a request for a family portrait in the first art class.

Evaluation of the artwork produced was done through questionnaires filled in by two panels of judges. On the panel of 20 educational specialists, 93 percent affirmed

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[1]Silver, Developing Skills, p. 80-84.

that the paintings provided evidence that art afforded opportunities to imagine, associate, and express thoughts and feelings; 2 percent denied that the paintings provided such evidence; and 5 percent qualified their answers. The panel of 20 art educators compared the art work of the deaf students with art work of hearing students, evaluating the pictures for evidence of subject matter, technique, sensitivity to art values, and technical skill. Results showed that 93.5 percent of the answers confirmed evidence of the above aspects, .4 percent indicated no evidence, and 6.1 percent of the ratings were qualified. Silver concluded that art teachers should try to stimulate communication, cognition, and adjustment and at the same time help students become sensitive to art values and articulate art expression.

Silver,[1] in 1967, conducted a demonstration project in the New York City area to investigate two hypotheses:

> (1) Given an adequate introduction to studio experiences and to the offerings of museums, deaf students can be expected to have as much aptitude and interest in the visual arts as do hearing students, and (2) vocational opportunities for the deaf in the visual arts are generally underestimated.[2]

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[1] Silver, Developing Skills, p. 84-97.

[2] Ibid., p. 84.

Free instruction in painting and sculpture and free field trips were offered to a limited number of deaf children and adults.

Fourteen classes were taught over two terms with new students each term. Adult classes, limited to 15 students, met for two hours on Saturday afternoons, and children's classes, limited to eight students, met for one hour Saturday mornings. Subjects were accepted as their applications were received, resulting in a total of 17 adults, 13 teenagers, and 24 children. The subjects included 19 deaf, nine hearing impaired, and 26 language impaired persons. The Torrance Test of Creative Thinking, figural form A, and three evaluations of drawings and paintings by panels of judges were the assessments used to compare the deaf students with hearing students enrolled in the judges' classes.

The Torrance test was administered to 12 students (age and type of impairment not specified). Comparison of subjects' scores with norms of hearing persons showed a high level of performance for the deaf subjects. In originality and elaboration average scores were in the 99th percentile; in fluency average scores were in the 97th percentile; and in flexibility average scores were in the 88th percentile.

The deaf students, from the first term of project classes, and the hearing students, from public elementary and secondary schools or adult education classes, were matched for age. One work by each student was chosen by the teacher. The judges were not informed which paintings were done by deaf or hearing students. On the evaluations of these judges the deaf teenagers scored slightly below the hearing teenagers, while deaf children and adults scored slightly higher than their hearing peers.

The second panel of judges, six elementary school art teachers and seven college or graduate school art teachers, compared the work of their own students (unspecified number) with portfolios of paintings and drawings by deaf students of comparable ages. In order to eliminate some bias, the educators were not told the purpose of the study or that the students were deaf. Portfolios submitted were those prepared by eight children, three teenagers, and two adults in the project classes and three seniors from a public school that had a program for the deaf. The combined average scores resulting from the judges' evaluations of the deaf students in the project class (N=13) were above average as compared to those of

their hearing peers. The scores of the deaf students from the public school (N=3) were below average as compared to those of the hearing students.

The third panel of judges visited the project classes and then assessed the differences in difficulty, interest, and gratification in teaching deaf and hearing students. The judges compared deaf students with their own in the areas of independence, interest in art, sensitivity, originality, and expressiveness. The judges included two persons who had taught only deaf students, three who had taught only hearing students, and six who had taught both deaf and hearing students. In comparing deaf and hearing students, the two teachers of the deaf rated deaf students lower in all categories with the exception of interest in art, where they rated the deaf the same. The remainder of the teachers rated the deaf students the same or higher in all categories. In comparing the teaching of deaf and hearing classes, the two teachers of the deaf rated deaf classes as more difficult, gratifying, and interesting. The remaining teachers (N=9) rated the deaf classes the same or higher in all categories, with the exception of one teacher who rated deaf classes as less difficult to teach.

Silver,[1] in 1973, conducted a state urban education project to assist an experimental group of deaf children to develop mathematical and logical ideas, develop methods of teaching these ideas through art, and develop procedures to evaluate cognitive achievement through art tasks. Art classes were conducted for 11 weeks with the experimental subjects attending one class per week. All subjects had language and hearing impairments caused by damage to the brain. The 18 subjects in the experimental group constituted a randomly selected 50 percent sample of all children in grades one through six, ages 8 to 15 years, in a school for language and hearing impaired children; the remaining children served as controls (N=18). Assessment techniques included the Torrance Test of Creative Thinking and evaluations, by an art therapist-painter and an art educator, of artwork produced.

The Torrance test was administered to all children in a class simultaneously. Analysis of results of the Torrance Test showed no significant differences between control and experimental groups in the areas of fluency,

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[1]Silver, Developing Skills, p. 97-100.

flexibility, or originality. Significant difference at the .05 level was found in the area of elaboration on the posttest in favor of the experimental group. Results were considered unclear because Silver believed that several subjects did not comprehend the test instructions.

With regard to art work produced, the judges evaluated the first work, a mid-term work, and the final work done by each child in the experimental group. The art work of the control group was not evaluated. A five-point scale was used to evaluate sensitivity and skill, and a three-point scale was used to evaluate expressiveness (ability to represent objects or events). The paintings or drawings were presented randomly and identified only by number. Statistical significance was found over the three trials for improvements in skill and expressiveness combined. The nine children who received the lowest score on their first drawings received the highest score on their last drawings.

Pang and Horrocks[1] investigated the creative abilities of deaf sixth graders, six boys and five girls

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[1]Pang and Horrocks, "Exploratory Study."

ages 11 and 12 years with intelligence quotients ranging from 60 to 130 based on the Wechsler Intelligence Scale for Children. Subjects, from a school for the deaf, were administered the Barron-Welsh Art Scale and the Torrance Figural Test of Creative Thinking by their classroom teacher.

Comparison of the mean scores of the deaf subjects with normative means for hearing subjects showed that the deaf subjects scored approximately the same in originality and fluency and higher in flexibility and elaboration. Pang and Horrocks concluded that the deaf children scored approximately the same or higher on the Torrance test, although it was expected that they would score significantly lower because their language development was retarded.

Johnson and Khatena,[1] in 1975, investigated the possible differences in verbal originality scores, obtained from Onomatopoeia and Images,[2] of 181 deaf and 236 hearing subjects ages 10 to 19 years. The subjects were non-mentally retarded and from families with incomes in the

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[1]Johnson and Khatena, "Comparative Study."

[2]Joe Khatena and E. Paul Torrance, Thinking Creatively With Sounds and Words: Norms Technical Manual (Lexington, Ma.: Personnel Press, 1973).

middle to low range. The deaf subjects, 89 males and 92 females, were drawn from two schools for the deaf in the southwest, and 98 percent were classified as severely to profoundly deaf. The hearing subjects, 96 males and 140 females, were drawn from eight Tidewater, Virginia public schools on the basis of availability. The Onomatopoeia and Images test was administered to all subjects by playing a recorded text in a non-test atmosphere in which subjects were encouraged to enjoy themselves. The deaf subjects received instructions on the record from the examiner who used total communication to translate. Before each response the record was stopped, and instructions were given to the subjects in total communication. For every five deaf subjects, there was one adult present who was skilled in total communication. The investigators tested all deaf subjects and one-half of the hearing subjects; the other one-half of the hearing subjects were tested by four graduate students whom the examiners had trained. Scoring was done on a scale of zero to four points according to infrequency and relevance of response; responses which showed a break away from perceptual set had occurred were awarded four points. The investigators and an undergraduate education major scored the tests; an interscorer reliability coefficient of .95 was obtained.

Data were analyzed using a 2x2x8 factorial analysis of variance with hearing status, sex, and eight age levels as the independent variables.[1] Results showed that hearing subjects scored significantly higher than deaf subjects on verbal originality. A significant interaction was found between hearing status and age; deaf subjects' scores fluctuated. A Newman-Keul's multiple-comparison test[2] showed the difference in age levels. Johnson and Khatena concluded that, with an emphasis on the auditory-visual modality of creative functioning, deaf subjects scored significantly lower than hearing subjects.

Singer and Lenahan[3] investigated the daydreams and fantasy material of 20 deaf children (17 girls and three boys) in a Day and Residential School for the Deaf in Buffalo, New York. The children were divided into two groups, bright (average age 12 years) and average (average

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[1]B. J. Winer, Statistical Principles in Experimental Design (New York: McGraw-Hill, 1962).

[2]Ibid.

[3]Singer and Lenahan, "Imagination Content."

age 13 years), based on intelligence scores on the Wechsler Performance Scale for Children.[1] All children were white and most had sustained deafness from birth. Each child was interviewed individually by a trained teacher of the deaf who asked questions about the child's general play patterns and dreams and asked the child to make up a story on impulse; answers were recorded verbatim. Data were divided into three categories: kind of play, elicited fantasy, and dream content. Each category was judged separately by two independent raters for imaginative content.

Results suggested that, in imagination, deaf children lag behind their peers by three to five years. In general, the responses of the deaf children were more concrete with brighter deaf subjects describing significantly more tragic and pessimistic incidents in every category. In one aspect, that of having imaginary playmates, the deaf children were not different from hearing children.

Kaltsounis[2] compared the fluency, flexibility, originality, and elaboration scores, obtained from

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[1]Wechsler, Wechsler Preschool and Primary Scale.

[2]Kaltsounis, "Differences in Creative Thinking."

Torrance's Test of Thinking Creatively with Pictures, of 172 white and 61 black deaf children in grades one, two, three, and four, whose mental and hearing abilities were not controlled. Subjects were drawn from the North Carolina Schools for the Deaf. Data were collected, according to directions set forth by Torrance, by three psychologists at the school for the deaf. Scoring of the activities was done by the investigator, according to standard scoring procedures.

Data were analyzed by an analysis of variance technique. With respect to the influence of race and grade level on divergent thinking there were significant differences in divergent thinking as a function of race for elaboration and of grade level for fluency and elaboration. An interaction occurred between race and grade level for fluency and elaboration. Another analysis of variance showed a significant difference in divergent thinking as a function of race for flexibility and elaboration. Analysis of variance to determine the influence of sex and grade level on fluency, flexibility, originality, and elaboration scores showed

significant differences, in divergent thinking as a function of grade level for fluency, flexibility, and elaboration. Kaltsounis concluded that in overall performance, white deaf children appeared to be superior to black deaf children.

Variables Which May Affect the Present Study

In designing the present research study and in planning dance instruction for hearing impaired students, several variables were identified that might influence or confound the results. Findings with respect to these variables as they relate to creativity and motor ability were summarized briefly in this section of the thesis.

The age of hearing impaired subjects was shown to affect both motor ability and creativity. Morsh[1] investigated motor performance of deaf and hearing

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[1]Morsh, "Motor Performance."

individuals and found that performance in all skills improved with age. Myklebust[1] also found that the motor ability of deaf subjects showed a progression with age. Torrance presented norms for his creativity tests based on educational level groupings. Inasmuch as educational level for normal individuals is associated with age, a difference is seen in creative abilities according to age, although the development is non-linear.[2]

Research indicated that the effect of sex on motor ability of hearing impaired subjects was questionable. In studies by Myklebust and Long, the motor performance of boys was found superior to that of girls.[3] No difference was found between sexes

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[1]Myklebust, "Significance of Etiology."

[2]Torrance, Tests.

[3]Myklebust, "Significance of Etiology;" Long, Motor Abilities.

in motor ability in a study by Carlson.[1] Philipp[2] found girls excelled over boys on some tasks while boys excelled on others.

The relationship between sex and creativity seemed to be questionable. In a study by Philipp[3] no significant difference was found between sexes on measures of creativity. In presentation of norms, Torrance did not differentiate between sexes.

Research indicated that the effect of hearing impairment on learning ability was not yet firmly established. Templin[4] found no difference between deaf and hearing subjects of the same age on classification tasks; however, she found the deaf inferior on tasks of analogy. She stated that if the type of reasoning being measured was familiar, the deaf

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[1]Carlson, "Assessment of Motor Abilities."

[2]Philipp, "Comparison of Motor Creativity."

[3]Ibid.

[4]Mildred C. Templin, The Development of Reasoning in Children With Normal and Defective Hearing (Minneapolis: University of Minnesota Press, 1950).

and hearing were equal in ability. Furth[1] found that hearing impaired individuals were not handicapped in learning the principles of sameness or symmetry but were handicapped in learning the concept of opposition, when compared to hearing children of the same age. Kates[2] found deaf subjects equal to hearing subjects in ability to learn and use logical concepts such as "and," "or," and "not." Analysis of Stanford Achievement scores[3] showed that reading achievement level was inversely related to degree of hearing loss. Singer and Lenahan[4] compared the imagination content of dreams of deaf and hearing children. Results indicated that the deaf subjects exhibited more concreteness and less originality than their hearing peers. Silver,[5] who

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[1]Hans G. Furth, "Visual Paired-Associates Task with Deaf and Hearing Children," Journal of Speech and Hearing Research 4 (June 1961): 172-177.

[2]Solis L. Kates, "Learning and Use of Logical Symbols by Deaf and Hearing Subjects," Journal of Abnormal Psychology 74 (Dec. 1969): 699-705.

[3]"Information Packet for Persons Planning to Administer the Stanford Achievement Test Special Edition for Hearing Impaired Students," Office of Demographic Studies, Gallaudet College, Washington, D.C., 1973. (Mimeographed.)

[4]Singer and Lenahan, "Imagination Content."

[5]Silver, "The Question of Imagination."

conducted three studies, found that deaf subjects equalled or excelled their hearing peers in imagination, originality, and abstract thinking when nonverbal assessment techniques were used.

The measurement of intelligence of hearing impaired individuals was considered a major problem by most authorities. The literature reviewed indicated that instructions on intelligence tests often are not understood and responses are affected by the poor language and/or expressive ability of the hearing impaired students. The administrators in the Salt Lake City School system believed that the scores from the Stanford Achievement Tests for the hearing impaired did not reliably assess the abilities of their students and considered the scores very general indicators.

The Stanford Achievement Test for hearing impaired students (SAT-HI) was developed to assess academic achievement of the hearing impaired after results from the first National Achievement Testing Program (NATP), in the spring of 1969, indicated that accurate assessment was not possible because of technical measurement problems.[1] The SAT-HI was chosen for the NATP because results of a survey

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[1] "Information Packet."

indicated it was the test most frequently used in educational programs for the deaf. In the second NATP, in spring of 1971, a screening test procedure, practice test materials, and printed test items previously teacher-dictated substantially improved accuracy and meaningfulness of scores. The results of the second NATP showed that hearing impaired students scored substantially higher on some subtests, such as mathematics and spelling, than on others. A student tested for level of reading comprehension would thus be tested at a level below achievement in mathematics and spelling. The most recent SAT-HI, 1973, included a modification designed to test students at the appropriate level for all subtests. The reading comprehension was used as a base level. Mathematics and spelling were one level higher while vocabulary and communication comprehension were one level lower. The SAT-HI evolved from the 1973 Stanford Achievement Test for nonhandicapped students and was considered the,

> best data, materials, and procedure yet available for the accurate assessment of the academic achievement of hearing impaired students.[1]

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[1]Ibid.

Summary

Studies reviewed in this chapter were classified into the following subheadings: motor behavior of deaf children, development of tests of creativity, creativity studies with hearing subjects, creativity studies with hearing impaired subjects, and variables which may affect the study. The findings were summarized on the chart on the following pages.

TABLE 1

SUMMARY OF RESEARCH

Study	Sample* HI	Sample* H	Method of** Research	Significant Results
Long[1] (1932)	89	89	DC	Balancing Board: hearing excelled deaf
	8-14 years			
Lehmann[2] (1936)	10		E	Yepsen Adjustment Test: improvement
	6-9 years			Rhythmic Skill: improvement
Morsh[3] (1936)	58	NS	DC	Tapping: hearing excelled deaf
	11-20 years			Steadiness: boys excelled girls; deaf exceeded hearing; improvement with age

*Hearing is abbreviated H, hearing impaired is abbreviated HI, and NS (not stated) is used when information such as number of subjects is not included.

** The following abbreviations are used: MS (metric study), DC (descriptive-comparative study), C (comparative study), E (experimental study), and D (descriptive study).

[1]Long, Motor Abilities.

[2]Lehmann, "A Study of Rhythms."

[3]Morsh, "Motor Performance."

TABLE 1 - Continued

Study	Sample HI	Sample H	Method of Research	Significant Results
				Balance: boys surpassed girls; deaf exceeded hearing except when blindfolded; bright hearing excelled over dull hearing; performance improved with age
				Location-Memory: deaf girls surpassed all groups; bright exceeded dull; improvement with age
				Speed-of-Eye: hearing surpassed deaf; boys exceeded girls; improvement with age
				Hand-Eye: improvement with age and practice
Myklebust[1] (1936)	274 ages NS		DC	Heath Rail-Walking Test: improvement with age; males exceeded females; meningitis inferior to all others

[1] Myklebust, "Significance of Etiology."

TABLE 1 - Continued

Study	Sample HI	Sample H	Method of Research	Significant Results
Guilford, et al.[1] (1951)	410 Air Force Men		MS	Written Test of Creativity factors: word fluency associational fluency ideational fluency adaptive flexibility spontaneous flexibility originality closure redefinition
Withers[2] (1960)	11 College age		MS	Plot Titles score correlated with originality; level of technique directly related to creativity
Lampard[3] (1960)	20 4-10 years	NS	DC	Art work: deaf lagged behind hearing in technique; deaf used less subject matter than hearing

[1] Guilford, et al., "Factor-Analytic Study II."

[2] Withers, "Measuring the Creativity."

[3] Lampard, "Art Work."

TABLE 1 - Continued

Study	Sample HI	Sample H	Method of Research	Significant Results
Fleming and Weintraub[1] (1962)		68 8-12.5 years	DC	Correlations: negative between verbal creativity and attitudinal rigidity; positive between verbal and nonverbal creativity
Stroup and Pielstick[2] (1965)		97 Grade 6	DC	No significant relationships between motor ability and creativity
Torrance[3] (1965)		NS Grades 1, 2, and 3	DC	Minnesota Tests of Creative Thinking, nonverbal Forms A and B: means for half of first and second graders exceeded fifth grade; third graders post test showed gain

[1]Fleming and Weintraub, "Attitudinal Rigidity."

[2]Stroup and Pielstick, "Motor Ability and Creativity."

[3]Torrance, "Seven Guides to Creativity."

TABLE 1 - Continued

Study	Sample HI	Sample H	Method of Research	Significant Results
Torrance and Hansen[1] (1965)	12 business teachers		DC	Divergent Power: low creative teachers asked more factual questions, high creative teachers asked more divergent questions; mean scores of high creative teachers exceeded means for low creative teachers
Searle[2] (1966)	36 college age		E	Torrance-Minnesota Creativity Tests: experimental group excelled over control
Silver[3] (1966)	54 children, teenagers and adults		DC	Torrance Test of Creative Thinking, Figural Form: deaf scored in 88th-99th percentile as compared to hearing norms Ratings of Art work: deaf children and adults scored higher than hearing

[1]Torrance and Hansen, "The Question-Asking Behavior."

[2]Searle, "Improving Creative Response." [3]Silver, Developing Skills.

TABLE 1 - Continued

Study	Sample HI	Sample H	Method of Research	Significant Results
				Ratings of classes: deaf classes rated higher over-all
Boyd[1] (1967)	90	90 8-10 years	DC	Oseretsky Tests: hearing exceeded deaf in equilibrium; 9 and 10-year-olds hearing surpassed deaf in balance; 8-year-old endogenous were superior to hearing in speed
				Van Der Lugt Test: hearing excelled over deaf on aiming and kinesthetic control of force and speed
Silver[2] (1967)	25		D	Questionnaire: paintings by deaf showed evidence of opportunities to imagine, associate and express thoughts and feelings, assess interests, abilities or needs
				Ratings: paintings by deaf showed evidence of subject matter, technique, sensitivity to art values, and technical skills

[1]Boyd, "Comparison of Motor Behavior."

[2]Silver, Developing Skills.

TABLE 1 - Continued

Study	Sample HI	Sample H	Method of Research	Significant Results
Pang and Horrocks[1] (1968)	11	11-12 years	DC	Torrance Test of Creative Thinking, Figural Form: deaf surpassed hearing norms in flexibility and elaboration
Wyrick[2] (1968)	25	college	MS	Motor Creativity Test: 4 items; face validity; equivalent forms reliability; internal reliability
Philipp[3] (1969)	65	grade 4	DC	Correlations: positive between verbal and figural creativity; boys excelled over girls in strength measures; girls exceeded boys in balance and agility measures
Barabasz[4] (1969)	41	7-8 years	DC	Torrance Test of Creative Thinking, Figural Form: reliable; intelligence correlates with creativity.

[1]Pang and Horrocks, "An Exploratory Study."

[2]Wyrick, "Development of a Test."

[3]Philipp, "Comparison of Creativity." [4]Barabasz, "Test-Retest Reliability."

TABLE 1 - Continued

Study	Sample HI	Sample H	Method of Research	Significant Results
Torrance and Aliotti[1] (1969)		118 grade 5	DC	Torrance Tests of Creative Thinking: Forms A and B consistent; verbal and figural forms functioned the same; males exceeded females in figural originality; females exceeded males in figural elaboration; test-retest reliability good
Kaltsounis[2] (1971)		232 grade 1-4	DC	Torrance Test of Creative Thinking, Figural Form: white deaf surpassed black deaf
Carlson[3] (1972)		48 8-18 years	D	Brace Motor Ability Test: 7-year-olds exceeded 5-year-olds; 10-year-olds excelled over 6-year-olds

[1]Torrance and Aliotti, "Sex Differences."

[2]Kaltsounis, "Differences in Creative Thinking."

[3]Carlson, "Assessment of Motor Ability."

TABLE 1 - Continued

Study	Sample HI	Sample H	Method of Research	Significant Results
Silver[1] (1973)	36 8-15 years		E	Torrance Test of Creative Thinking, Figural Form: experimental gain exceeded control in elaboration Ratings of Art work: improvement in skill and expressiveness
Glover[2] (1974)	25 college age		MS	Motor Creativity Test: 3 items; validity was good
Halpin and Halpin[3] (1974)	3 adult		DC	Torrance Tests of Creative Thinking: interscorer reliability was good
Johnson and Khatena[4] (1975)	181 10-19 years	236	DC	Onomatopoeia and Images; hearing exceeded deaf in verbal originality; deaf scores increased with age, hearing scores fluctuated

[1]Silver, Developing Skills. [2]Glover, "Motor Creativity Test."

[3]Halpin and Halpin, "Self-Trained Scorers."

[4]Johnson and Khatena, "Comparative Study."

TABLE 1 - Continued

Study	Sample HI	Sample H	Method of Research	Significant Results
Del Rey and Steiner[1] (1976)	30	30	DC	Pursuit-Rotor: 11-year-olds excelled over 7-year-olds; accuracy at 30, 40 and 50 RPM varied for all
	7-11 years			
Lindsey and O'Neal[2] (1976)	31	71	DC	Static and Dynamic Balance Tests: hearing exceeded deaf
	8-9 years			
Singer and Lenahan[3] (1976)	20	NS	DC	Ratings: deaf behind hearing by 3-5 years; deaf responses more concrete; bright deaf responses more tragic and pessimistic than all other responses
	12-13 years			

[1]Del Rey and Steiner, "Pursuit-Rotor."

[2]Lindsey and O'Neal, "Static and Dynamic Balance."

[3]Singer and Lenahan, "Imagination Content."

TABLE 1 - Continued

Study	Sample HI	Sample H	Method of Research	Significant Results
Martinson and Seagoe[1] (1977)	106 grades 3-6		DC	Guilford Tests of Creative Thinking: high intelligence group surpassed low in association Ratings of Products: high intelligence group surpassed low in poem writing, story writing, science, and rhythms

[1]Martinson and Seagoe, Abilities of Young Children.

CHAPTER III

PROCEDURES FOLLOWED IN THE DEVELOPMENT OF THE STUDY

The present study was developed to determine if a series of creative dance/movement sessions would improve the creative thinking and dance/movement skills of deaf children, nine to fourteen years old, who participated in a 10 week experimental period. Data were collected on creative thinking as measured by Torrance's Thinking Creatively With Pictures, Figural Form B,[1] and on dance/movement skills as measured by the Reber Dance/Movement Skills Assessment.

The procedures followed in the development of the study are presented under the following headings: preliminary procedures, selection of subjects, selection of Torrance's Thinking Creatively With Pictures, development of the Reber Dance/Movement Skills Assessment, collection of creativity data and scoring of tests, collection of the dance/movement skills data, implementation of experimental period, organization and treatment of data, and preparation of the final report.

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[1]Torrance, Tests.

Preliminary Procedures

The investigator surveyed and studied the related literature pertaining to creativity and to movement skills. The resulting information was summarized and presented in a comprehensive review of literature.

Permission to use human subjects in the study was secured from the Human Subjects Review Committee at Texas Woman's University. Permission was obtained also from the Salt Lake Extension Classes[1] Curriculum Coordinators, parents of the subjects, and subjects who participated in the study. A copy of the permission forms appears in the appendix.

A tentative outline was developed and revised according to suggestions from members of the thesis committee. The approved outline was then filed in the form of a Prospectus in the Office of the Provost of the Graduate School.

Selection of the Subjects

The population chosen for study were deaf students, ages nine to fourteen years, in the Salt Lake City, Utah, area. The sampling design used was convenience cluster sampling. Permission forms were sent to all parents/guardians of students in the Salt Lake Extension Classes whose classroom teachers (n=5) agreed to participate in the study. All

[1]The total and oral communication divisions were considered extensions of the public school classes. Classes for the hearing impaired were housed in public schools; however, the curriculum was independent.

students (n=31), ages nine to fourteen years, with completed permission forms were accepted in the study.

The following criteria were used to determine whose data could be subjected to statistical analysis at the end of the 10 week experimental period: (1) children who were present on the initial and final days of testing and (2) children who were present for 70 or more percent of the sessions comprising the experimental period. Of the 13 subjects in the experimental group and 18 subjects in the control group agreeing to participation, 10 subjects in each group met these criteria and thus provided data for the study. Personal data collected from the files of these subjects and used in describing them in the findings chapter included the following: intelligence as measured by the Leiter International Performance Scale and the Otis-Lennon Mental Ability Test, grade level functioning as measured by the Stanford Achievement Test Special Edition for Hearing Impaired Students, sex, age, hearing loss in the speech range measured in decibels, etiology, age of onset of deafness, and mode of communication.

Selection of Torrance's Thinking Creatively With Pictures

Criteria for selection of a test to measure the creative thinking of deaf children were established as follows:

(1) was a widely used test, (2) required no substantial amount of verbal or written responses, (3) had been used previously in studies with deaf subjects, (4) had established validity, and (5) had established reliability.

The Torrance Tests of Creative Thinking have been used extensively and have norms developed from analysis of over 500 tests administered to kindergarten through college age subjects.[1] Torrance's Thinking Creatively With Pictures was selected for use in this study because it requires no verbal or written responses beyond a description or identification of what was drawn. The test had been used previously in studies involving deaf subjects and was preferred over a verbal test of creativity.[2]

In the discussion concerning validity of his tests Torrance states that:

> the concept of an overall validity coefficient for tests of creative thinking ability is grossly inappropriate.[3]

Validity of the Torrance tests has been investigated in a number of studies. Torrance and his associates have found no widely accepted criteria for concurrent validity. Content validity is claimed based on the effort to utilize

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[1]Torrance, Tests, p. 48.

[2]Silver, "The Question of Imagination," p. 349.

[3]Torrance, Tests, p. 21.

the best theory and research available as the basis for the test.[1]

The Torrance test had been used previously with hearing impaired subjects; however no test-retest reliability coefficients were found in the literature. Test-retest reliability coefficients were computed on a small sample (n=8) of subjects in the present study. The reliability coefficient for the entire test computed by intraclass reliability method was .96. Intraclass reliability coefficients for originality, flexibility, fluency, and elaboration were .82, .87, .85, and .88 respectively. Test-retest reliability coefficients from studies done on normal individuals ranged from low (.35) to high (.97).[2] Torrance states that the handling of motivation factors is important in conducting a test-retest reliability study and that,

> because the emotional, physical, motivational and mental health factors affect creative functioning and development and may contribute to a lowering of test-retest reliability as traditionally estimated, it should not be assumed that the measuring instruments are unreliable or lacking in usefulness.[3]

Torrance suggests also that a part of the variance in

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[1] Torrance, Tests, p. 22.

[2] Ibid., p. 20.

[3] Ibid., p. 16.

reported test-retest reliability may be due to researchers handling the motivational aspects of testing more adequately in experimental studies than in normative studies.[1]

Development of the Reber Dance/Movement Skills Assessment

No test was available which appeared valid for the measurement of dance/movement skill of deaf children. It was decided, therefore, to develop an original test. In the development of the Reber Dance/Movement Skills Assessment, it was first necessary to select the specific skills to be studied. Plié, relevé, spinal roll-up, battement, sauté, leap, 4/4 rhythm, and 3/4 rhythm were selected empirically, after a review of the literature, as eight basic skills involved in movement education. Each skill was then analyzed into components which could be observed and rated quantitatively. These analyses were prepared in a written format appropriate for an assessment instrument. A five point rating scale was developed for the eight skills selected. A copy of this instrument appears in the appendix.

The Skills Assessment was reviewed by four dance specialists familiar with teaching children, teaching the handicapped, and/or developing tests. The specialists

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[1]Torrance, Tests, p. 20.

agreed the assessment included the basic components for each skill as was generally accepted. Face validity was claimed.

The intraclass reliability correlation coefficient technique was used to analyze test-retest reliability for the 20 subjects. The intraclass reliability coefficient computed was .97, indicating that the test was reliable for the population tested. An intraclass reliability coefficient was computed to investigate the overall objectivity between raters. An obtained coefficient of .99 indicated that the raters scored objectively.

Decisions were made concerning the physical environment where the skills would be tested, the instructions to be given to the subjects, and the appropriate format for score sheets to record data. A room with a wooden floor was selected as the ideal environment for testing the movement skills. Individual testing was decided on in order to avoid peer embarrassment. Instructions to the subjects were written as simply as possible to account for all levels of comprehension. A copy of instructions may be found in the appendix with the sample assessment. The format selected for recording data was to type each skill on a separate 8x5 sheet of paper and to staple the eight sheets together and place them on a clipboard.

Raters familiar with dance,children, and/or the handicapped were trained before the initial testing session. Training involved detailed inspection of the test and discussion of terminology to assure uniform interpretations. After each skill was examined, sample performances of each skill were evaluated and discussed. Out of six raters agreeing to participate, three raters completed the training and evaluated the subjects. The investigator acted as one of the raters.

Collection of Creativity Data and Scoring of Tests

Torrance's Thinking Creatively With Pictures was administered to the subjects by the investigator in groups of five to seven in their regular classrooms. The classroom teacher was present to ascertain that the instructions were communicated in familiar language and understood by the subjects. The instructions provided with the tests were simplified, and an instructor of sign language in Salt Lake City, Utah, aided the investigator in preparing the instructions and translating them into sign language. A copy of the simplified instructions may be found in the appendix.

All activities on the Torrance test were scored for originality and elaboration and activities 2 and 3 were scored for fluency and flexibility. A total fluency score,

originality score, elaboration score, and flexibility score were computed as well as a total composite score. The Torrance test consisted of three drawing tasks: (1) Picture Construction--designed to sample the individual's ability to find a purpose for something which has no definite purpose and to elaborate and define; (2) Picture Completion--designed to sample the individual's ability to structure and integrate as well as to create beyond the commonplace and to elaborate; (3) Circles--designed to sample the individual's ability to disrupt structure, to create something new, and to elaborate.

Torrance derived the originality scoring system from the response of 500 subjects ranging in grade from kindergarten to college.[1] Activity 1 (Picture Construction) was scored on a six point scale, activity 2 (Picture Completion) on a three point scale, and activity 3 (Circles) on a four point scale. For each activity scoring was based on the percentage of responses which occurred in Torrance's normative sample of 500. For example in activity 2, Picture Completion, zero credit was given to responses which showed "no creative strength" since they comprised 5

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[1]Paul Torrance, Torrance Tests of Creative Thinking, Direction Manual and Scoring Guide (Lexington, Mass: Personnel Press, 1974) p. 14.

percent or more of the responses from the normative sample. One point was given to responses which showed "some creative strength" since they comprised only 2-4.9 percent of the responses from the normative sample of 500 tests. All responses made by less than 2 percent of the normative groups were awarded two points.

Elaboration was scored on each response and had no scale. One point was given for each idea which contributed to the response beyond the basics necessary to communicate the idea.

The fluency score was simply the number of figures completed. In activity 2 the maximum score possible was 10; in activity 3 duplications and irrelevant responses were subtracted from the number completed.

The flexibility score was determined by counting the number of different categories into which the subjects' responses could be classified. These categories were presented in the Norms-Technical Manual and were derived by Torrance from analysis of data from his normative group. Where a response did not fit in a given category, the scorer created a new category.

Scoring of the tests completed by the deaf subjects in the present study was completed in accordance with these standardized procedures. All scoring was done by the

investigator. To examine objectivity, the tests were scored two times, with a one-month interval between scoring. The results of the two scorings were almost identical.

Collection of the Dance/Movement Skills Data

Criteria for selection of raters included familiarity with teaching dance, familiarity with children, and/or the handicapped, and availability for both pre and post testing. Training of the raters was completed in one two-hour session in which each skill was discussed, terminology clarified, and sample performances (by the raters) were evaluated. Of the six raters agreeing to participation, three completed the training and evaluated the subjects. The investigator acted as one of the raters.

Subjects were pretested and retested between February 25 and March 7, 1980, and posttested between May 12 and May 22, 1980. Subjects were required to wear loose clothing on the day of the skills testing, and shoes were removed prior to testing. For each skill the subjects were instructed to first watch the action as performed by the investigator, then perform the action with the investigator, and finally perform the skill alone. Instructions were repeated as many times as necessary for the subject to understand. Each subject was tested individually in an

empty classroom. Average testing time for each subject was seven minutes. Details of instructions and the rating scale may be found in the appendix.

Three raters evaluated the subjects' movement skills. An intraclass reliability correlation technique was used to analyze the overall objectivity between raters. A coefficient of .99 was obtained, indicating that the raters scored the subjects' performances objectively. In the statistical analysis the subjects' scores were reduced to a single score by averaging the scores given by all of the raters.

Implementation of Experimental Period

Creative dance/movement sessions for 45 minutes a day, two days a week, for 10 weeks were planned and conducted as the independent variable. Since the subjects comprising the experimental group attended two different schools, each session was conducted twice with methodology, time of day, and as many other variables as possible held constant. The control group received no creative dance/movement instructions and adhered to the regular school schedule.

Speech reading, writing, gesturing/pantomiming, and demonstration comprised the mode of communication used with the oral communication students. Communication between the investigator and total communication students

included the above as well as signing exact English.

Decisions were made concerning general methodology to be used. A circle was selected as the most appropriate formation of students to allow all students to see the instructor. A tambour or another visual input instrument was used when teaching rather than counting or verbal requests. When teaching concepts of dance, the method of repetition of a variety of examples was used. A tambour, an African drum, and a tambourine were the instruments used in the sessions. The loudness of each instrument varied with the intended purpose (background or signaling) and the need (which students had neglected to wear their hearing aids that day and what was needed to elicit a response).

Organization and Treatment of Data

Data from Torrance's Thinking Creatively With Pictures and the Reber Dance/Movement Skills Assessment were organized for presentation in the appendix. Descriptive statistics including range, mean, standard deviation, and standard error of the mean were computed for each group for each set of data.

Intraclass reliability coefficients[1] were computed to

[1]Margaret Safrit, Evaluation in Physical Education--Assessing Motor Behavior (Englewood Cliffs, New Jersey: Prentice-Hall, 1973).

assess test-retest reliability for the Reber Dance/Movement Skills Assessment and Thinking Creatively With Pictures. Intraclass coefficients were computed also for each of the four aspects of creativity on the Torrance test and for overall objectivity between raters on the Skills Assessment.

In order to test the hypotheses of the study, analysis of covariance BMDP2V and SPSS[1] were determined the most appropriate technique. This procedure was selected because it statistically matched subjects on the pretest and therefore made appropriate statistical adjustments for initial differences before analyzing posttest differences.

Preparation of the Final Report

The data were organized, analyzed, and presented in tables. A written report was prepared and revised in accordance with committee members' suggestions. The final report was then prepared including five chapters and an appendix. Included in the appendix were a letter of approval from the Human Research Review Committee at Texas Woman's University, letters of approval from the Salt Lake Extension Classes Curriculum Coordinators, the permission form sent

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[1]William J. Dixon and Michael B. Brown, Biomedical Computer Programs P-Series (Berkeley, Calif.: University of California Press, 1979); Norman H. Nie, et al, Statistical Package for the Social Sciences 2nd ed. (New York: McGraw-Hill Book Co., 1975).

to parents/guardians of subjects and subjects, the Reber Dance/Movement Skills Assessment, instructions for the Torrance test simplified for presentation, instructions for the Skills Assessment, the raw data for the Torrance test and the Skills Assessment, and a daily lesson outline.

CHAPTER IV

PRESENTATION OF THE FINDINGS

Results of the statistical analysis of the data were presented in this chapter. The problem of this study was to compare the creative thinking ability and dance/movement skills of public school deaf students involved in 10 weeks of experimental creative dance/movement classes (n=10) with a similar group of children (n=10) receiving no creative dance/movement classes. Torrance's Thinking Creatively With Pictures, Figural Form B, and the Reber Dance/Movement Skills Assessment were used to collect data before and after the experimental period. This chapter was divided into the following sections: description of subjects, description of groups on creative thinking, comparison of groups on creative thinking, and description and comparison of groups on movement skills.

Description of the Subjects

Twenty deaf students, ages nine to fourteen years, from the Salt Lake City, Utah, extension classes, provided data for the study. Table 2 describes the two groups with respect to the factors of sex, age, intelligence, SAT grade

equivalence, hearing loss, etiology, age of onset of deafness, and mode of communication. Because subjects in the two groups could not be matched on these factors, analysis of covariance was used in the final statistical analysis.

Visual inspection of Table 2 shows that there were more males than females, overall. The age range was from nine to fourteen years; SAT grade equivalence ranged from first to sixth grade. Most students were of average intelligence, with some considered above average and some below average. Hearing loss for all students was either severe (71-90 dB) or profound (91 dB or more).

TABLE 2

DESCRIPTION OF SUBJECTS WITH RESPECT TO FACTORS WHICH MAY INFLUENCE CREATIVITY OR MOTOR SKILLS

Variable	Control	Experimental	Total
Sex			
Male	8	5	13
Female	2	5	7
Age			
13-14	6	2	8
11-12	2	3	5
9-10	2	5	7

TABLE 2--Continued

Variable	Control	Experi-mental	Total
Intelligence*			
Above Average	2	3	5
Average	5	6	11
Below Average	3	1	4
SAT Grade Equivalence			
6th	1	0	1
5th	2	1	3
3rd	3	2	5
2nd	1	0	1
1st	3	7	10
Hearing Loss in dB**			
71-90	4	1	5
90 +	6	8	14
Etiology			
Unknown	4	3	7
Infection (maternal)	2	2	4
Meningitis	1	2	3
Infection (child)	1	1	2
Premature birth	0	2	2
Hereditary	2	0	2
Age of Onset of Deafness			
Birth	6	7	13
Infancy	3	2	5
2-3 years	1	1	2
Mode of Communication			
Total	4	7	11
Oral	6	3	9

*As measured by the Otis-Lennon Mental Ability Test or the Leiter International Performance Scale.

**No record of audiological test on file for one subject; hearing loss refers to the degree of handicap in the speech range when the subject is not wearing a hearing aid.

Description of Groups on Creative Thinking

Torrance's Thinking Creatively With Pictures was administered to the subjects before and after a 10 week experimental period of creative dance/movement sessions. Table 3 presents the descriptive statistics for the control (n=10) and experimental (n=10) groups on the four aspects of creativity and the total composite score.

Table 3 shows that the average scores on fluency for the control group were 23.60 and 19.90 and for the experimental group were 19.30 and 22.90 on the pre and post tests respectively. Individual differences within each group were expressed by standard deviations of 8.29 and 4.89 for the control group and 9.02 and 9.40 for the experimental group. The fluency scores were based on the Picture Completion and Circles activities. The greatest number of pictures which could be completed was 10 and the greatest number of circles which could be converted into drawings was 36. Duplications and irrelevant responses were not included in the scoring of the Circles activity.

A study of Table 3 shows that the average scores on originality for the control group were 16.60 and 15.60 and for the experimental group were 11.40 and 24.80 on the pre and post tests respectively. Individual differences were expressed by standard deviations of 10.06 and 6.74

TABLE 3

DESCRIPTION OF GROUPS WITH RESPECT TO PRE-POST CREATIVITY SCORES

Variable	Range	Mean	S.D.	$S.E._m$
Fluency				
Control Pre	23 (12-34)	23.60	8.29	2.62
Control Post	18 (12-29)	19.90	4.89	1.55
Experimental Pre	34 (8-41)	19.30	9.02	2.85
Experimental Post	35 (11-45)	22.90	9.40	2.97
Originality				
Control Pre	31 (7-37)	16.60	10.06	3.18
Control Post	25 (5-29)	15.60	6.74	2.13
Experimental Pre	19 (1-19)	11.40	5.91	1.87
Experimental Post	57 (7-63)	24.80	19.08	6.03
Flexibility				
Control Pre	15 (7-21)	11.30	4.92	1.56
Control Post	11 (9-19)	12.30	3.23	1.02
Experimental Pre	17 (4-20)	12.40	4.57	1.45
Experimental Post	12 (8-19)	13.80	3.65	1.15
Elaboration				
Control Pre	51 (12-62)	38.40	19.04	6.02
Control Post	68 (4-71)	35.40	20.36	6.44
Experimental Pre	68 (5-72)	32.40	20.06	6.34
Experimental Post	47 (25-71)	47.50	15.07	4.77

TABLE 3--Continued

Variable	Range	Mean	S.D.	$S.E._m$
Composite Score				
Control Pre	110 (40-149)	91.00	33.25	7.43
Control Post	74 (44-117)	83.20	24.13	5.40
Experimental Pre	109 (27-135)	74.40	35.54	7.95
Experimental Post	81 (74-154)	108.90	29.08	6.50

for the control group and 5.91 and 19.08 for the experimental group. The originality scores were derived from all three activities. Scoring was based on the statistical infrequency of responses in Torrance's normative sample of 500 subjects ranging from kindergarten to college age. In activity 1 the highest possible score was five points. Activity 2 was rated on a three point scale and activity 3 on a four point scale.

Table 3 shows that the average scores on flexibility for the control group were 11.30 and 12.30 and for the experimental group were 12.40 and 13.80 on the pre and post tests respectively. Individual differences were expressed by standard deviations of 4.92 and 3.23 for the control group and 4.57 and 3.65 for the experimental group.

The flexibility score was based on the Picture Completion and Circles activities. In both activities categories were listed into which the scorer placed responses. The categories were derived from analysis of Torrance's normative sample of 500 cases. After each response was categorized the number of categories used was the flexibility score.

A study of Table 3 shows that the average scores on elaboration for the control group were 38.40 and 35.40 and for the experimental group were 32.40 and 47.50 on the pre and post tests respectively. Individual differences were expressed by standard deviations of 19.04 and 20.36 for the control group and 20.06 and 15.07 for the experimental group. The elaboration score was based on all three activities with no limit on the number of points possible. One point was awarded to each idea which contributed to the idea or story being presented above and beyond the basics needed to communicate the idea.

Table 3 shows that the means on the composite scores for the control group were 91.00 and 83.20 and for the experimental group were 74.40 and 108.90 on the pre and post tests respectively. Individual differences were expressed by standard deviations of 33.25 and 24.13

for the control group and 35.54 and 29.08 for the experimental group. The fluency, originality, flexibility, and elaboration scores were added together to form the composite score.

Comparison of Groups on Creative Thinking

To examine the hypothesis of the study pertaining to the creativity data, a one-way analysis of covariance was selected. This technique was selected because it is a method used when comparing group means on a dependent variable (posttest scores) when the groups cannot be equated on this variable at the beginning of an experimental study. The adjusted means shown in Table 4 are the result of the analysis procedure done to equate the groups on the covariate (pretest measure). This procedure is followed so that any differences found after the experiment may be interpreted as a result of the treatment rather than original differences on the pretest scores.

A comparison of the means and adjusted means in Table 4 shows that the posttest means were adjusted for initial differences on the covariate (pretest scores). A multiple correlation squared value was computed for each of the variables with adjusted means to give an indication of the amount of variance accounted for in the relationship

between the variate and the covariate. The multiple correlation squared values for originality, flexibility, elaboration, fluency, and the composite score were .22, .49, .57, .04, and .59, respectively.

TABLE 4

MEANS AND ADJUSTED MEANS FOR CREATIVITY SCORES

Variable	Experimental		Control	
	Mean	Adjusted Mean	Mean	Adjusted Mean
Originality	24.20	26.43	15.60	13.97
Flexibility	13.80	14.07	12.30	12.03
Elaboration	47.50	49.47	35.40	33.43
Fluency	22.90	22.96	19.90	19.84
Composite Score	108.90	113.36	83.20	78.74

The null hypothesis pertaining to Torrance's Thinking Creatively With Pictures was examined at the .05 level of significance: there was no significant difference between experimental and control groups on creativity. Table 5 presents a summary of the analysis of covariance

findings on the overall Torrance test scores and the individual aspects.

A study of Table 5 indicates a statistically significant difference for the composite score and the elaboration aspect of creativity; thus the F ratio exceeded the required value to reject the null hypothesis. These findings indicate that the experimental period of creative dance/movement sessions produced statistically significant increases in scores of the experimental group on the Torrance test over the control group which received no creative dance/movement sessions.

Description and Comparison of Groups on Movement Skills

The Reber Dance/Movement Skills Assessment was administered to the subjects before and after a 10 week experimental period of creative dance/movement sessions. The activities comprising the test were designed to sample eight basic skills of movement: plié, relevé, spinal roll-up, battement tendu, sauté, leap, 4/4 rhythm, and 3/4 rhythm. The test was an original test developed to use for evaluation of movement skills in the present study. An intraclass reliability coefficient of .97 was obtained on a sample of 20 subjects. An overall interrater objectivity coefficient of .99 was obtained. Table 6 presents the

TABLE 5

SUMMARY OF ANALYSES OF COVARIANCE ON TORRANCE CREATIVITY MEASURE (n=20)

Variable	df			SS			MS		F	p
	B	W	T	B	W	T	B	W		
Originality	1	17	18	698.30	3206.69	3904.99	698.30	188.63	3.70	.07
Flexibility	1	17	18	20.55	114.91	135.46	20.55	6.76	3.04	.10
Elaboration	1	17	18	1252.87	2813.47	4066.34	1252.87	165.50	7.57*	.01
Fluency	1	17	18	45.39	1010.85	1056.24	45.39	59.46	.76	.39
Composite Score	1	17	18	5627.40	6701.41	12328.81	5627.40	394.20	14.28*	.002

*Significant at the .05 level or better.

descriptive statistics for the control (n=10) and experimental (n=10) groups.

The dance/movement skills score was the composite score of all eight skills, each of which was rated on a five point scale. The highest possible score was 40.

A study of Table 6 shows that the pretest means for the control and experimental groups were 17.97 and 18.60, respectively and the standard deviations were 4.23 and 4.12, respectively. The posttest means for the control and experimental groups were 17.55 and 21.93 with standard deviations of 4.93 and 3.88, respectively.

TABLE 6

DESCRIPTION OF GROUPS WITH RESPECT TO PRE-POST MOVEMENT SCORES

Source	Range	Mean	S.D.	$S.E._m$
Control				
Pretest	13.00 (12.00-24.00)	17.97	42.3	1.34
Posttest	14.50 (11.50-25.00)	17.55	4.93	1.56
Experimental				
Pretest	12.33 (13.33-24.66)	18.50	4.12	1.30
Posttest	11.67 (17.33-29.00)	21.93	3.88	1.23

To study the hypothesis of the study pertaining to the dance/movement skills data, a one-way analysis of covariance was selected. This technique was selected because it is a method used when comparing group means on a dependent variable (posttest treatment) when the groups are not equated on the covariate (pretest measure). This procedure was done so that any differences found after the experiment could be interpreted as a result of the treatment rather than original differences on the pretest scores. Table 7 presents the means and adjusted means for the Reber Dance/Movement Skills Assessment.

TABLE 7

MEANS AND ADJUSTED POSTTEST MEANS FOR MOVEMENT SKILLS SCORES

	Experimental		Control	
Source	Mean	Adjusted Mean	Mean	Adjusted Mean
Movement Scores	21.93	21.67	17.55	17.82

Table 7 demonstrates that the posttest means were adjusted for initial differences on the covariate (pretest scores). A multiple correlation squared value was computed to give an indication of the amount of variance accounted

for in the relationship between the variate and the covariate. The multiple correlation squared value was .72.

The null hypothesis pertaining to the Reber Dance/Movement Skills Assessment was examined at the .05 level of significance: there was no significant difference between experimental and control groups on dance/movement skills. Table 8 presents a summary of the analysis of covariance findings on the movement skills assessment.

TABLE 8

SUMMARY OF ANALYSIS OF COVARIANCE ON MOVEMENT SKILLS ASSESSMENT

Source of Variance	df	SS	MS	F*	p
Between	1	73.57	73.57	10.00	.005
Within	17	125.02	7.35		
Total	18	198.59			

*F (1,17,.95)=4.45

A study of Table 8 shows that the F ratio exceeded the required value to reject the null hypothesis. These findings indicate that the experimental period of creative dance/movement sessions produced an increase in scores in the experimental group on the movement test over the

control group which received no creative dance/movement sessions.

CHAPTER V

SUMMARY, CONCLUSIONS, AND RECOMMENDATIONS FOR FURTHER STUDIES

The present investigation entailed a study of the changes in creative thinking and dance/movement skills of deaf students, nine to fourteen years old, after participation in a 10 week experimental period. After initial pretesting with both groups, one group of 10 students participated in creative dance/movement sessions. The second group of 10 subjects served as control group and adhered to the regular class schedule. Pre and posttest data were collected on creative thinking using Torrance's Thinking Creatively With Pictures, Form B, and on movement skills using the Reber Dance/Movement Skills Assessment.

Literature reviewed in the area of motor abilities of hearing impaired subjects revealed inconsistent findings. Among the studies reviewed were those by Long, Morsh, Myklebust, Boyd, Carlson, Lindsey and O'Neal, Del Rey and Steiner, and Pennella. Most of the studies included a measure of either static or dynamic balance or both; results ranged from deaf subjects found to be significantly inferior to hearing subjects to deaf subjects found to be superior to hearing subjects. The literature agreed that deaf children

followed the same general motor development pattern as hearing children.

Literature pertaining to development of tests of creativity was reviewed. Studies included those by Guilford, Withers, Wyrick, Barabasz, Torrance and Aliotti, Glover, Halpin and Halpin, Torrance, and Dodds. Research indicated that motor creativity may be related to creative thinking. It might, however, not be preferable to assess motor creativity using tests designed for other aspects of creative ability.

Research on creativity of hearing subjects indicated that there were no significant relationships between creativity and sex, motor ability, age, or intelligence. Studies reviewed included those by Fleming and Weintraub, Stroup and Pielstick, Torrance and Hansen, Philipp, and Martinson and Seagoe.

Related studies evaluating creativity of deaf subjects or comparing deaf and hearing subjects were reviewed also. These studies included those conducted by Lampard, Silver, Pang and Horrocks, Johnson and Khatena, Singer and Lenahan, and Kaltsounis. Results indicated that deaf subjects were equal to hearing subjects in creative skills when evaluated on nonverbal tests. Young deaf children were found to lag behind hearing children in level of

technique in art work but were equal to their hearing peers on art work ratings when older.

Since a widely recognized test of creativity was needed for use in this study, Torrance's Thinking Creatively With Pictures was selected. The Torrance test yielded fluency, flexibility, originality, and elaboration scores as well as a total composite score based on three drawings. The literature indicated that test-retest reliability coefficients from studies on non-handicapped subjects ranged from low (.35) to high (.97). Intraclass reliability coefficients computed on a small sample of deaf subjects (n=8) in the present study were within an acceptable range (.82-.88) for the individual aspects. The intraclass reliability coefficient for the entire test was .96.

The Reber Dance/Movement Skills Assessment was developed for use in the study to assess movement skills of subjects before and after a 10 week experimental period. The test sampled eight basic skills: plié, relevé, spinal roll-up, battement tendu, sauté, leap, 4/4 rhythm, and 3/4 rhythm. Each skill was rated on a five point scale; a total of 40 points was possible. An intraclass reliability coefficient of .97 was computed, indicating that the test was reliable for the population studied. An overall interrater objectivity coefficient of .99 was computed, indicating that the judges were objective.

Analysis of covariance was the statistical procedure used. The Torrance creativity data and the movement skills data were treated by the one-way analysis of covariance technique to determine any significant differences between control and experimental groups.

On the basis of the findings of this study, two null hypotheses were rejected at the .05 level of significance.

1. There was no significant difference between experimental and control groups in creative thinking ability.

2. There was no significant difference between experimental and control groups in dance/movement skills.

Conclusion

Within the limitations of this study, it was concluded that the creative thinking and dance/movement skills of hearing impaired intermediate level students can be improved through 20 sessions of creative dance/movement instruction spaced over a 10 week period. The aspect of creative thinking which changed most was elaboration. Because of the small sample size, however, the findings of this study should be interpreted with caution.

Discussion

The purpose of this investigation was to provide information on creative dance/movement and hearing impaired intermediate level students. Findings resulted which have implications for teaching methodology with hearing impaired students. The success of the creative dance/movement sessions and the relatively short duration of time in evoking increases in creative thinking ability as well as improved movement skills leads to the recommendation for creative dance/movement classes to be included in the experiences of deaf individuals, particularly where creativity is not stressed in the classroom teaching methodology.

Recommendations for Further Studies

The investigator recommends the following studies to be undertaken.

1. A study correlating movement skills with creative thinking abilities of deaf individuals.

2. A study comparing deaf subjects of different ages on the Torrance test with the norms developed for non-handicapped subjects.

3. A study correlating motor creativity, as measured by Dodds, with creative thinking as measured by the Torrance tests of creative thinking.

APPENDIX

TEXAS WOMAN'S UNIVERSITY
BOX 22337, TWU STATION
DENTON, TEXAS 76204

HUMAN RESEARCH REVIEW COMMITTEE

Name of Investigator: Rebecca I. Reber Center: Denton

Address: 661 Downington Ave. Date: December 5, 1979

Salt Lake City, Utah 84105

Dear Rebecca I. Reber

Your study entitled A Creative Dance/Movement Study with Hearing-Impaired Young Adults

has been reviewed by a committee of the Human Research Review Committee and it appears to meet our requirements in regard to protection of the individual's rights.

Please be reminded that both the University and the Department of Health, Education, and Welfare regulations require that written consents must be obtained from all human subjects in your studies. These forms must be kept on file by you.

Furthermore, should your project change, another review by the Committee is required, according to DHEW regulations.

Please add the following statement to your Informed Consent Form: "No medical service or compensation is provided to subjects by the University as a result of injury from participation in research."

Sincerely,

Marilyn Hunsaker

Chairman, Human Research Review Committee

at Denton

You may wish to consider the variable of semicircular canal involvement in some or perhaps all of your subjects. Suggest ENG evaluations. Also, I assume that provisions have been made to insure understanding of the consent form for those parents and guardians who may also be deaf.

Utah Schools for the Deaf and the Blind
846 Twentieth Street Ogden, Utah 84401
Telephone 399-9831
Salt Lake Toll Free Telephone 298-3311

HARLAN M. FULMER
Superintendent

February 28, 1980

Ms. Rebecca Reber
661 Downington Avenue
Salt Lake City, Utah 84105

Dear Ms. Reber:

This letter is to inform you that your request to conduct your thesis study with hearing impaired children enrolled in the Utah School for the Deaf Total Communication Extension Division program has been approved. As I understand, after instruction in creative movement, you will study the changes in creative thinking and dance/movement skills in the children.

As discussed, the program will be conducted during the spring of 1980, during hours arranged in conjunction with the classroom teachers. The study as approved involves pre/post assessment of creativity and dance/movement skills; collection of personal data for matching control and experimental groups, and sample case studies; and conducting 20 creative movement sessions with the experimental group.

I am pleased to have you work with the children. I'm sure it will be an educational experience for both you and them. If I can be of any help, please let me know.

Yours truly,

Beverly Ashby

Beverly K. Ashby
Curriculum Coordinator
Salt Lake Extension Classes
Total Communication Department
1838 South 1500 East
Salt Lake City, Utah 84105

BKA:kl
cc: Mr. Christopulos

Utah Schools for the Deaf and the Blind
846 Twentieth Street, Ogden, Utah 84401
Telephone 399-9631
Salt Lake Toll Free Telephone 298-3311

HARLAN M. FULMER
Superintendent

April 2, 1980

Rebecca Reber
661 Downington Avenue
Salt Lake City, Utah 84105

Dear Ms. Reber:

This letter is to inform you that your request to conduct your thesis study with hearing impaired students in the Salt Lake City deaf education program has been approved. As discussed, the program may be conducted during the spring of 1980, during hours arranged in conjunction with the classroom teacher. The study, as approved, involves pre/post assessment of creativity and dance/movement skills; collection of personal data for matching control and experimental groups, and for sample case studies; and conducting 20 creative movement sessions with the experimental group.

We will appreciate a summary of your findings so that we might determine what curriculum modifications might be in order. I hope our scheduling problems will not be too great an obstacle.

Yours truly,

Wallace T. Bruce
Curriculum Coordinator
Salt Lake Extension Classes
1838 South 1500 East
Salt Lake City, Utah 84105

WTB:kl

Consent Form

(Written Presentation)

Consent to Act as a Subject for Educational Research:

1. I hereby authorize Rebecca I. Reber to perform the following procedures:

   A. Conduct creative dance/movement classes.
   B. Administer Torrance Test of Thinking Creatively With Pictures before and after dance/movement classes.
   C. Administer Dance Awareness Inventory before and after dance/movement classes.
   D. Review records (in order to obtain background information on the students).

2. The procedures listed in Paragraph 1 have been explained to me by Rebecca I. Reber, and I understand them. I understand that names of all persons in the study will be kept confidential. Likewise test scores will be kept confidential. There is no risk involved in participation in this study; there is the same possibility of muscle strains/sprains that may occur in physical education classes but every precaution will be taken to warm students up properly.

3. An offer to answer all of my questions regarding the study has been made. I understand that I may terminate my participation in the study at any time.

_____ _____

Subject's Signature Date

_____ _____

Parent/Guardian Signature Date

_____ _____

Witness Date

Addendum: No medical service or compensation is provided to subjects by the university as a result of injury from participation in research.

REBER DANCE/MOVEMENT SKILLS ASSESSMENT

PLIE

Level	Criteria
1	Lowers self.
2	Bends appropriate joints (hips, knees, ankles) to lower.
3	Aligns 2 of 4 (shoulders, hips, knees, feet).
4	Controls plié.
5	Aligns 4 of 4.

RELEVE

Level	Criteria
1	Rises up.
2	Lifts heels to rise; aligns 2 of 3 (shoulders, hips, feet).
3	Balances 3 seconds.
4	Extends torso and legs.
5	Rises to 3/4 toe; aligns shoulders, hips and feet.

SPINAL ROLL-UP

Level	Criteria
1	Arrives at upright position
2	Rolls through the back.
3	Begins roll at base of back; arrives upright aligning 2 of 4.

4	Executes in a smooth, controlled manner.
5	Stands with weight forward on feet; arrives aligned.

BATTEMENT TENDU

Level	Criteria
1	Places foot to side.
2	Maintains some foot-floor contact.
3	Aligns 2 of 4 (shoulders, hips, feet, knees); extends standing and working legs.
4	Executes in a smooth, continuous action.
5	Rolls through the foot; aligns body.

SAUTE

Level	Criteria
1	Leaves floor.
2	Pushes with both feet.
3	Uses feet and legs for push; aligns 2 of 4 (shoulders, hips, knees, hips).
4	Executes in an even, controlled action; uses feet and legs for push and land.
5	Aligns 4 of 4.

LEAP

Level	Criteria
1	Uses push-off action.
2	Attempts to alternate legs.
3	Alternates legs 4 successive times.

4	Executes in a smooth, continuous action; uses feet and legs for push and land.
5	Extends leg in brush through.

4/4 RHYTHM

Level	Criteria
1	Claps with drum.
2	Maintains rhythm on own.
3	Claps correct number of beats.
4	Emphasizes first beat of measure.
5	Uses feet or another body part as in 4.

3/4 RHYTHM

Level	Criteria
1	Claps with drum.
2	Maintains rhythm on own.
3	Claps correct number of beats.
4	Emphasizes first beat of measure.
5	Uses feet or another body part as in 4.

INSTRUCTIONS FOR TORRANCE TEST AS ALTERED FOR PRESENTATION TO HEARING IMPAIRED SUBJECTS

An instructor of sign language in Salt Lake City, Utah, was contacted as a resource person to aid in the translation of instructions on the Torrance test from written to signed. Instructions given for the Torrance test were simplified and the resource person instructed the investigator in signs which were unfamiliar.

General Introduction

Today we will do some drawing activities. In each activity I want you to think of ideas that no one else will think of. Think of lots of ideas. Make every idea tell an exciting story. You will have a time limit for each activity so use your time well.

Activity 1

On the first page is a curved shape. Draw a picture with the shape as part of your picture. Try to make a picture that no one else will think of. Keep adding new ideas. Make your picture tell an exciting story. When you are finished think of a title for your picture and write it at the bottom. Use your title to help tell your story. Close your book when you are finished. Any questions? You will have ten minutes. Open your booklet to the first page and begin.

10 min. Stop. Did you remember to give your picture a title?

Activity 2

By adding lines to the unfinished drawings on these two pages you can draw some interesting pictures. Try to think of pictures no one else will think of. Tell a story with your picture and keep adding new ideas. Think of an interesting title for each of your drawings and write it beneath each one. Any questions? You will have ten minutes. When you finish close your book. Open your book and begin. 10 min. Stop. Did you remember to think of titles for your drawings?

Activity 3

In this activity see how many things or pictures you can make with the circles on these two pages. The circles should be the main part of what you draw. You can draw inside the circle or outside the circle or both, wherever you want. Try to think of ideas that no one else will think of. Think of as many different ideas as you can and add lots of ideas. Make your drawings tell an interesting story. Add names or titles below your drawings. Any questions? You will have ten minutes. When you finish close your booklet. Open your booklet and begin. 10 min. Stop. Did you remember to title your drawings?

INSTRUCTIONS FOR THE REBER DANCE/MOVEMENT SKILLS ASSESSMENT

The format selected for recording scores was to have each skill on a separate 8 x 5 sheet. All eight skills were then stapled together and placed on a clipboard. During the testing session the raters did not confer. Subjects performed the skills at an angle to the raters so that alignment as well as skill performance could be observed.

Instructions to the Raters

Place the number corresponding to the appropriate skill level in the blank provided below the descriptions. The skill levels should be considered cumulative, i.e., to rate a skill level of 3 the subject should perform levels 1, 2, and 3.

Instructions to the Subjects

We are going to do some dance exercises. Please watch me do the exercise first. (Demonstration by investigator.) Now do the exercise with me. (Subject and investigator perform skill together.) Good! Now I want you to try it by yourself, please. (Student performs the skill alone.) Good! Now watch the next exercise.

The above instructions were repeated for plié, relevé, spinal roll-up, battement tendu, sauté, and leap. One

addition was made for instructions for the relevé which was the request--balance as long as you can. The following instructions were used for testing 4/4 rhythm and 3/4 rhythm.

Now I am going to beat the drum, please watch the rhythm. (Investigator beats two measures of 4/4 rhythm.) Now try clapping with the drum beat. (Investigator and subject perform simultaneously.) Good! Now clap the same rhythm by yourself. (Subject performs alone.) Good! Now use your feet or another body part to show me the same rhythm. (Student performs alone.) Good! Thank you very much, that is all, you may return to class.

TORRANCE TEST RAW SCORES FOR EXPERIMENTAL GROUP
(n=10)

Subject	Pretest					Retest					Posttest				
	Flu	Flex	Orig	Elab	Total	Flu	Flex	Orig	Elab	Total	Flu	Flex	Orig	Elab	Total
1	15	9	10	14	48	--	--	--	--	--	11	9	13	41	74
2	14	10	14	41	79	16	12	12	28	68	17	13	11	51	92
3	13	8	8	18	47	12	6	3	10	31	18	8	7	60	93
4	23	18	17	72	130	12	16	15	52	95	26	14	12	64	116
5	16	11	7	30	64	17	11	7	30	65	29	19	35	71	154
6	24	4	1	21	50	20	12	5	17	54	18	12	14	31	75
7	8	7	7	5	27	--	--	--	--	--	45	16	15	25	101
8	19	12	19	38	88	13	11	16	25	65	18	14	51	47	196
9	41	20	19	55	135	28	20	35	22	105	21	18	63	52	154
10	20	14	12	30	76	22	13	17	21	73	26	14	27	33	100

TORRANCE TEST RAW SCORES FOR CONTROL GROUP
(n=10)

	Pretest					Posttest				
Subject	Flu	Flex	Orig	Elab	Total	Flu	Flex	Orig	Elab	Total
1	23	11	10	53	97	19	11	15	56	101
2	33	12	20	60	125	23	10	13	71	117
3	12	9	7	12	40	19	13	10	11	53
4	20	9	16	41	86	17	9	17	44	87
5	30	7	8	12	57	16	10	14	4	44
6	29	21	37	62	149	29	19	24	35	107
7	16	11	11	47	85	17	11	29	39	96
8	34	20	31	36	121	24	17	14	29	84
9	27	12	11	16	66	23	11	5	20	59
10	12	12	15	45	84	8	6	16	17	47

MOVEMENT ASSESSMENT RAW SCORES
FOR EXPERIMENTAL AND CONTROL
GROUPS
(n=20)

Subject	Group	Pretest	Retest	Posttest
1	E	13.33	13.00	17.33
2	E	15.00	15.00	19.33
3	E	14.00	14.00	25.00
4	E	17.00	16.00	18.66
5	E	20.00	18.00	21.66
6	E	16.00	16.00	17.66
7	E	20.00	13.66	21.00
8	E	22.00	22.00	29.00
9	E	22.33	22.33	24.00
10	E	24.66	24.00	25.66
1	C	16.00	16.00	16.66
2	C	16.00	16.00	14.33
3	C	12.00	12.00	10.00
4	C	14.00	14.00	16.00
5	C	13.00	13.00	11.50
6	C	24.00	24.00	23.00
7	C	23.00	23.50	25.00
8	C	20.00	20.50	17.00
9	C	21.00	21.33	20.00
10	C	20.60	20.60	22.00

MOVEMENT ASSESSMENT RAW SCORES FOR
OVERALL INTERRATER OBJECTIVITY
(n=18)

Subject	Group	Rater 1	Rater 2	Rater 3
1	E	11	16	13
2	E	15	15	15
3	E	14	14	14
4	E	17	17	17
5	E	20	20	20
6	E	16	16	16
7	E	20	20	20
8	E	22	22	22
9	E	24	24	24
10	E	25	25	24
1	C	16	16	16
2	C	16	16	16
3	C	12	12	12
4	C	14	14	14
5	C	13	13	13
6	C	24	24	24
9	C	21	21	21
10	C	21	21	20

CREATIVE DANCE/MOVEMENT SESSIONS

The creative dance/movement sessions were conducted with three main teaching areas in mind: basic movement skills, movement with others, and composition through structured improvisation. Basic skills included teaching items such as turns, jumps, hops, leaps, qualities of movement, and uses of energy. Awareness of movement with others involved use of such techniques as mirroring, weight-sharing, and group or partner shapes. Composition through structured improvisation included use of instructor guided ordering of movements, pictures from magazines, pipe cleaner shapes, and a feeling bag (emotions or feeling written on slips of paper and drawn from a bag).

The overall methodology for teaching these areas was creative rather than directive. In a creative approach the instructor guides the student and obtains the final end through the students' experimentation rather than by showing the students one desired end product to be copied. Questions and comments to guide students and elicit movement responses included--"How many ways . . . ?"; "Show me a new way . . . !"; "Is there another way . . . ?"; "What can you add to . . . ?"; "Let's try . . . .". Acceptance of whatever is created through experimentation is necessary; however, through positive reinforcement and guidance,

concepts and skills can be taught. Teaching in this way encourages responses unique to each individual student and group. The daily lesson outline presents the basic ideas and techniques used in teaching the experimental sessions. The classes were taught from the same lesson plans and varied only in as much as each individual responded in a unique way to the material presented.

DAILY LESSON OUTLINE

Day	Objective	Methods and Materials	Outcome
I	turns, suspend, alternative ways	request different ways to turn, "freezing" or hold of motion, variety in shapes	guided creation of "mini-dance"
II	awareness of movement with others	mirroring techniques with variations: eyes closed, torso only, touching with a body part, moving around the room	partners became aware of each other and new movements through mirroring
III	bound and free use of energy, jump, hop	request opposing energies in sequence, simultaneously, in a variety of locomotor actions	increased awareness of energy use
IV	levels, leap, alternative ways	scarves under feet (brush), freezing different ways at all levels, attaching scarves to body parts and moving scarves different ways.	awareness of brush into leap, new ways of moving, levels
V	composition through structured improvisation	guided ordering into sequence: move onto floor, freeze low level, move to partner, freeze, mirror, move to center, group freeze	creation of a dance

OUTLINE--Continued

Day	Objective	Methods and Materials	Outcome
VI	vibratory, sustained, movement with others, composition	move like "lightening" or "slow," alone and with others, dance sequence: move alone (vibratory) to center, move as a group (sustained)	creation of a dance
VII	review of concepts	written outline and request for performance of concepts	review of concepts and relating appropriate movement term to action
VIII	plié, twist, tilt new and different ways	pipe cleaners formed into shapes which bodies attempt to recreate	unique shapes, awareness of twist, tilt, rotate
IX, X	use of qualities to express emotion	"feeling bag" activity; a quality was selected to express the emotion drawn, individual performances	individual performances, awareness of relationship between qualities and expression of emotions
XI	movement with others	weight sharing with partners, finding supporting shapes, "if one left the other would fall"	awareness of sharing weight and responsibility

OUTLINE--Continued

Day	Objective	Methods and Materials	Outcome
XII, XIII	movement with others	tubular knit material, scarves and inner tubes available, experimentation alone and with a partner, how many ways to move, shapes	series of three locomotor actions or shapes using props
XIV, XV	composition	pictures from magazines, each student chose a picture and "sculptured" bodies to the shape in the picture	group shapes which became a dance moving from one to another
XVI	shapes, weight sharing	pipe cleaners formed and placed together, small groups attempt to recreate	experimentation, some sequences of two or three shapes
XVII	composition	individual or partner work on personal compositions using learned techniques and previously used props	beginning of compositions, tentative sequences formed
XVIII, XIX	composition	all props available, investigatior guided students over trouble spots	completion of individual dances and group dances, awareness of how a dance is composed

OUTLINE--Continued

Day	Objective	Methods and Materials	Outcome
XX	performance for classroom teacher and one other class	performance of student choreographed pieces	increased awareness of creative dance movement

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