EFFECTS OF READINESS ON INCIDENTAL LEARNING IN EDUCABLE MENTALLY RETARDED AND INTELLECTUALLY AVERAGE CHILDREN

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PREFACE

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CHAPTER I

INTRODUCTION

Recent years has evidenced an escalation on research on the learning patterns of the mentally retarded. Increased interest and activity has been influenced by a number of factors. There has been a greater emphasis in the elevation of the social order, an increased incidence of known retardation, encouraging medical discoveries, and increased government support for the financing of research. As a result, increased professional involvement of various disciplines have created a number of approaches to the study of the problems of mental retardation. However, a common approach to research in this area continues to be the comparison of the behavioral characteristics of the retardate with those of other populations.[1,2] This has resulted in the increased attention to research which has focused on learning characteristics of individuals on different intellectual levels.[3] Another

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[1]Lloyd M. Dunn, "Educable Mentally Retarded Children," Exceptional Children in the Schools, ed. L. M. Dunn (New York, 1963), pp. 53-127.

[2]Orville G. Johnson, "The Education of Mentally Retarded Children," Education of Exceptional Children and Youth, ed. William M. Cruickshank and G. Orville Johnson (Englewood Cliffs, N. J., c 1967), 2nd ed., pp. 194-237.

[3]Norman R. Ellis and Margaret W. Pryer, M. K. Distefano, and Ronald Pryer, "Learning in Mentally Retarded, Normal, and Superior Subjects," American Journal of Mental Deficiency, Vol. 64, No. 4 (March, 1960), pp. 725-734.

important issue regarding the individual's learning capacity has been the assumption that readiness is necessary for learning to occur.[4,5] It is also assumed that learning occurs more rapidly and efficiently if the individual is familiar with the materials utilized in the learning experience.[6,7]

The mentally retarded, as a group, have been described as having unique learning characteristics. One characteristic associated with the retardate has been the limited ability to learn incidentally. This seems to imply that incidental learning is contingent upon intelligence and would imply that mentally retarded individuals tend to acquire less knowledge through incidental learning than individuals of higher intellectual levels.[8,9]

Assuming readiness for learning is necessary for learning to occur, it would appear that a readiness activity introducing materials relative to incidental learning would increase the amount of incidental learning one could expect the individual to acquire.

Assuming that incidental learning is contingent upon intelligence

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[4]Orville G. Johnson, Comparative Studies of Some Learning Characteristics in Mentally Retarded and Normal Children of the Same Mental Age (Syracuse, 1958).

[5]Alfred A. Baumeister, "Problems in Comparative Studies of Mental Retardates and Normals," American Journal of Mental Deficiency, Vol. 71, No. 3 (March, 1967), pp. 869,875.

[6]Orville G. Johnson, Education for the Slow Learners (Englewood Cliffs, N. J., 1963), pp. 308-317.

[7]Herbert Goldstein and Dorothy M. Seigle, A Curriculum Guide for Teachers of the Educable Mentally Handicapped, Illinois Department of Public Instruction (Springfield, 1958), pp. 4-18.

[8]Ibid., Goldstein and Seigle.

[9]Ibid., Dunn.

and that readiness increases the amount of incidental learning, it would appear that mentally retarded and intellectually average children who have been given a readiness activity for an incidental learning would perform at a higher level than those who had not.

The implication has been made that the mentally retarded acquire less information because they are less able to learn incidentally when their ability or performance is compared to individuals of higher intellectual levels. Benoit stated that the mentally retarded are less perceptive and selective of the stimuli within their environment, therefore, less able to make integrate stimuli without conscious effort. His statements were based on Hebb's theory of behavior in relation to mental retardation.[10]

Statement of the Problem

The purpose of this study was to determine if there was a difference in the ability of educable mentally retarded and intellectually average students to learn incidently on a specific task, and if there was a difference in the amount of incidental learning between educable mentally retarded and intellectually average students who had been given a readiness activity for the learning task and those who had not been given this activity.

Hypotheses

The following hypotheses were formulated:

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[10]Paul Benoit, "Application of Hebb's Theory to Understanding the Learning Disability of Children with Mental Retardation," Training School Bulletin, Vol. 57, No. 1 (May, 1960), pp. 18-23.

Hypothesis I. There will be no statistically significant difference in the effects of readiness (R) on the amount of incidental learning (IL).

Hypothesis II. There will be no statistically significant difference in the effect of the level of intelligence on the amount of incidental learning (IL).

Hypothesis III. The amount of incidental learning (IL) will not be significantly influenced by the interaction of readiness (R) and intelligence.

Limitations of the Study

The subjects for this study were limited to Palm Beach County Public Schools, Palm Beach County, Florida. The age range of the subjects was limited to twelve years through thirteen years. All subjects had been evaluated on the Wechsler Intelligence Scale for Children (WISC).

The subjects in the educable mentally retarded groups were reported to have intelligence quotients within the 50-75 range as measured by the Wechsler Intelligence Test for Children (WISC). These subjects were enrolled in special education classes for the mentally retarded.

The subjects in the intellectually average groups were reported to have intelligence quotients within the 90-110 range as measured by the Wechsler Intelligence Scale for Children (WISC). These subjects were enrolled in regular classes.

The study was further limited in that the study was made near the end of the academic school year. Testing was completed two weeks

prior to the school's closing for the summer vacation.

Justification of the Study

Educational planning for the mentally retarded child is generally based on the premise that the retarded have specific learning characteristics which differ from children of higher intellectual ability. Most special education programs emphasize the need for longer readiness programs since mentally retarded children generally require more experiences than are required for normal children.[11,12] Nevertheless, little research has been done on the effectiveness of readiness activities for incidental learning with mentally retarded subjects. Questions concerning how much educable mentally retarded children acquire incidental learning remain unanswered.

The inference drawn from this study pertain to curriculum planning for the educable mentally retarded child. Differences existing between educable mentally retarded and intellectually average subjects on incidental learning ability and whether a readiness activity influenced the performance on the incidental learning task are investigated. Results from this study add to the body of knowledge regarding learning characteristics of the mentally retarded.

Definition of the Terms

1. Educable mentally retarded child. For the purpose of this study,

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[11] Norris G. Haring and Richard L. Schiefelbusch, Methods in Special Education (New York, 1967), pp. 76-85.

[12] Jerome H. Rothstein (ed), Mental Retardation: Readings and Resources. (New York, 1965), pp. 227-229.

a child who had been defined as having an intelligence quotient between 50 and 75 on the Wechsler Intelligence Scale for Children (WISC).

2. Intellectually average children. For the purpose of this study, a child who has been defined as having an intelligence quotient between 90 and 110 on the Wechsler Intelligence Scale for Children (WISC).

3. Incidental Learning. Learning that takes place without some formal instruction to learn and without some ascertainable motive.[13]

4. Readiness. For the purpose of this study, the planned introductory activity for familiarizing the subject with materials which will be used in the learning task.

5. Non-readiness. For the purpose of this study, the absence of an introductory readiness activity to precede the learning task.

Organization of the Study

Chapter I has given an introduction to the problem to be studied. It included the statement of the problem; hypotheses, limitations, and justification of the study, and the definition of the terms.

Chapter II presents a review of the literature including research in incidental learning involving different intellectual levels and research in incidental learning with normal subjects.

Chapter III describes the population, materials, and procedures used. The statistical method used to test the hypotheses previously stated is given.

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[13]H. B. English and Ava English, Dictionary of Psychological and Psychoanalytical Terms (New York, 1958), p. 290.

Chapter IV contains an analysis of the data. This chapter suggests the degree to which the hypotheses are confirmed or rejected.

Chapter V presents a discussion of the results and implications of this study, including recommendations regarding future research in this area.

CHAPTER II

REVIEW OF THE LITERATURE

Incidental Learning as Related to Intelligence

A number of studies have investigated incidental learning of the mentally retarded. The procedure followed by many investigators has been the comparison of mentally retarded and normal subjects matched either on mental age or chronological age. Other method variables employed have included: recall, retention, reinforcement, and task complexity. Williams introduced the effect of readiness on incidental learning in his investigation of educable mentally retarded, normal, and gifted children. The ninety subjects in this experiment were between the ages of seven years and nine years eleven months. Thirty subjects represented each of the three intellectual levels, educable mentally retarded, normal, and gifted. Each group was sub-divided into a readiness and non-readiness treatment. The subjects assigned to the readiness groups were given an activity utilizing the materials which would be involved in the learning task. All groups were given an intentional learning task followed by a task to measure incidental learning. The criterion was the number of correct responses on the incidental learning task.

Results of these findings indicated a significant interaction among levels of intelligence ($p < .05$). An analysis of the effect of readiness or non-readiness in incidental learning was significant

($p < .05$) for both educable mentally retarded and normal subjects. Analysis of the effect of readiness or non-readiness in incidental learning with gifted subjects resulted in no significance. Conclusions were that readiness, as used in this investigation, was necessary for learning to occur in educable mentally retarded and normal subjects. Readiness had no statistically significant effect on the gifted subjects. The findings suggested that incidental learning is not necessarily contingent upon intelligence.[14]

Hetherington and Banta investigated incidental and intentional learning and retention using normal and mentally retarded subjects of the same mental age. Ninety subjects were used, thirty were selected for each of the following groups: familially retarded, organically retarded, and normal. These researchers felt the learning tasks which had been used in other investigations may be inappropriate for the populations used, therefore, may yield differences or biased results. Their experiment included four separate experimental sessions: incidental learning, incidental retention, intentional learning, and intentional retention.

The results of the investigations by Hetherington and Banta reported that familially retardates and normal subjects performed significantly better on incidental learning than the organically retarded ($p < .01$). All groups improved over successive trials of intentional learning but there were no significant differences between groups. After a forty-eight hour period no significant differ-

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[14]Eddie H. Williams, "Effects of Readiness on Incidental Learning in EMR, Normal, and Gifted Children," American Journal of Mental Deficiency, Vol. 75, No. 2 (March, 1970), pp. 117-119.

ences were found on a recall test for incidental learning.[15]

Baumeister investigated incidental learning and retention employing retardates and normals who were matched on chronological age. The subjects were comprised of thirty retardates and thirty normals between the ages of eleven and fourteen years. The subjects from each intellectual group were assigned to one of two treatment conditions, intentional learning or incidental learning. Ten stimulus pictures showing one common object were shown the subjects one at a time. The subjects in the intentional learning group were told to remember the object pictured, while the incidental learning group were told to remember the color. All subjects were given an immediate recall test. Forty-eight hours later they were tested again. The normals performed significantly better on the immediate recall test ($p < .05$). Both groups, normals and retarded, performed equally well on the recognition test of incidental material after forty-eight hours. The retardates performed significantly better than the normals on retention of intentional learning forty-eight hours later ($p < .01$) suggesting that the learning deficit of the mentally retarded is task specific.[16]

Goldstein and Kass compared educable mentally retarded and gifted children of the same mental age to find if educable mentally retarded children acquire learning incidently during a directed task and how accurate is the learning acquired. In the directed learning task,

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[15]E. M. Hetherington and Thomas J. Banta, "Incidental and Intentional Learning in Normal and Mentally Retarded Children," Journal of Comparative and Physiological Psychology, Vol. 55, No. 3 (March, 1962) pp. 402-404.

[16]Alfred A. Baumeister, "A Comparison of Normals and Retardates with Respect to Incidental and Intentional Learning," American Journal of Mental Deficiency, Vol. 48, No. 3 (November, 1963), pp. 404-408.

the subjects were shown a stimulus picture of a street scene. There were many numerals in the picture, however, the subjects were asked to point out the number 2's. Incidental learning was measured by three activities: naming, describing in detail, and identifying. After one minute exposure time, the stimulus picture was removed and the subjects asked to name what was in the picture; to describe each item in detail and to identify from cut-outs presented those that were in the picture and those that were not.

The retarded children performed as well as the gifted of the same mental age, both quanitatively and qualitatively. However, as the tasks became more complex the retarded were superior in number of responses but were less accurate in the responses given.[17]

Ross studied incidental learning of educable mentally retarded children on the incidental learning of number concepts through the use of games. The experimental group learned to play small group games requiring the manipulation of numbers. The control group spent equal time in traditional number study. The same number concepts were covered by both groups. To avoid the Hawthorne effect, the control group spent equal time with the game controllers in an enjoyable but unrelated activity. At the end of a nine-month period, both groups were administered arithmetic achievement tests and an evaluation was made of general game skills.

The experimental group scored significantly higher in all areas: number knowledge, quanitative vocabulary, and general game skills.

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[17]Herbert Goldstein and Corinne Kass, "Incidental Learning of Educable Mentally Retarded and Gifted Children," American Journal of Mental Deficiency, Vol. 66, No. 2 (September, 1961), pp. 245-249.

Teachers and parents also reported that many of the subjects were able to use quantitative terms in the classroom and during free play for the first time in their lives. Social gains and changes of self concept were reported as side effects. These were not included in the analysis of data but were considered an important developmental aspect of the subjects involved.[18]

Gardner and Brandl investigated the incidental learning of mentally retarded adolescents in relation to various incentive-reinforcement conditions. The subjects were between the ages of thirteen through sixteen years of age and were enrolled in special education classes in public school. The learning task was a serial list of ten geometric forms. Incidental learning was measured immediately after the learning tasks by matching the correct color to the geometric forms. Subjects were assigned to one of three treatment groups: no incentive, social reinforcement, and tangible incentives. Subjects assigned to the no incentive group were only given instructions. Subjects assigned to the social reinforcement group were given supportive verbal praise during the entire testing period. Subjects assigned to the tangible incentive group were given a choice of fifty cents or a prize of comparable value.[19] Social reinforcement resulted in the more efficient incidental learning ($p < .05$).

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[18]Dorothea Ross, "Incidental Learning of Number Concepts in small Group Games," American Journal of Mental Deficiency, Vol. 74, No. 5 (March, 1970), pp. 718-725.

[19]W. I. Gardner and C. Brandl, "Reinforcement Conditions and Incidental Learning in Mentally Retarded Adolescents," American Journal of Mental Deficiency, Vol. 72, No. 2 (Sept. 1967), pp. 215-219.

Allied Literature

A number of studies in incidental learning have used normal subjects. Various method variables used by researchers in these studies have included reinforcement, age, sex, orientation, speed and task complexity.

Bahrick studied the acquisition of incidental learning in relation to the simultaneous progress of intentional learning. The study was based on the assumption that incidental learning occurs during the stages of intentional learning when motivation is low. One hundred college students were subdivided and assigned to one of five groups according to the amount of training allowed on a serial memory task (25%, 50%, 75%, 100%, or 150% efficiency). The training was followed immediately by an incidental learning test. Greatest gains in incidental learning were made during the initial stages of learning and the period of over-learning. Conclusions were that the amount of incidental learning acquired by the subject was related both to his uncertainty of the intentional task and by his level of motivation for performance.[20]

In another study Bahrick investigated the relation between the amount of incidental learning and the strength of an induced motive for a learning task. The population used in this experiment were students enrolled in an elementary psychology class. The subjects were assigned to either a high or low incentive group. Subjects in the high incentive group were told to do their very best and offered a

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[20]Harry P. Bahrick, "Incidental Learning at Five Stages of Intentional Learning," Journal of Experimental Psychology, Vol. 54, No. 4 (April, 1957), pp. 170-172.

monetary bonus for speed of learning. Subjects in the low incentive group were told that the experiment was designed to see how well they could learn without exerting effort. A memory drum was used for the learning task. Colored geometric forms were presented with instructions to learn the names of the forms. The incidental learning was the association of the color to the form.

Results indicated faster intentional learning under the high incentive condition, the incidental learning was significantly lower for this group as hypothesized.[21]

Kausler, Laughlin, and Trapp replicated the Bahrick study using a population of seventh and eighth grade children. The subjects were arranged in matched pairs by IQ score, sex, and school. Random assignment of pairs was made to one of two groups, an incentive group or non-incentive group.

Subjects in the incentive group were told they could earn from 0.25 to $1.50 depending on how well they performed. Money was not paid until the experiment with the individual child was completed.

After the session with each subject, a brief interview was held. Questions asked were related to how hard they had tried to remember each form during the directed learning task. There was an increase of affirmative responses as the amount of incentive had increased for the subjects.

The incentive effect increased the range of attention to all cues with this population. The incentive group performed better on inci-

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[21]Harry P. Bahrick, "Incidental Learning Under Two Incentive Conditions," Journal of Experimental Psychology, Vol. 47, No. 3 (March, 1954), pp. 170-172.

dental learning than the non-incentive group. It was generalized from the findings that learning set under the influence of incentive incorporated incidental as well as intentional learning.[22]

Seigel investigated frequency and mode of presentation of the incidental stimuli on the incidental learning of eight - and - fourteen year olds to determine differences in performance as related to age. No age differences were found on incidental learning scores. Age did affect other measures. Inhibition of attention to irrelevant cues does not appear to be under control by younger subjects while older subjects were not significantly affected. Older subjects profit a great deal from feedback, even if they are wrong.

Correlation of scores on intelligence tests for the fourteen year old subjects were not significantly related to incidental learning. No intelligence test scores were available for the eight year old subjects. Results were available for the Gates Primary Reading Test. Correlation of incidental learning and reading scores indicated that better readers demonstrated poorer performance in incidental learning.[23]

Deichmann, Speltz, and Kausler investigated developmental trends in the intentional and incidental learning components of a verbal discrimination task. Two experiments were used to obtain the data. Experiment I investigated the relationship between age and an inten-

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[22]Donald H. Kausler, Patrick R. Laughlin and E. Philip Trapp, "Effects of Incentive Set on Relevant and Irrelevant (Incidental) Learning in Children," Child Development, Vol. 58 (1959), pp. 452-455.

[23]Alexander W. Seigel, "Variables Affecting Incidental Learning in Children," Child Development, Vol. 39 (September, 1969), pp. 957-968.

tional verbal discrimination task. Incidental learning was measured and related to grade level. The subjects in this experiment were middle class children randomly selected from grades four, six, and eight in a parochial school. The thirty-six subjects were equally represented in number from the three grades and there were equal numbers of boys and girls at each level.

A verbal discrimination test was employed for the intentional learning task followed by an associative recall test to measure incidental learning.

The results indicated a trend toward superior learning by the youngest age group, however, it did not reach a level of significance. No difference in intentional verbal discrimination was indicated between sixth and eighth grade subjects. This suggested some other mechanism was in operation besides age. Observation indicated rehearsal responses practiced by older subjects during directed learning as a possible effect. This led into the second experiment.

Experiment II investigated the effect of rehearsal activity on age-verbal discrimination relationship. Subjects for this experiment were enrolled in a public school district from the following grades: kindergarten, third, sixth, and ninth. Subjects were assigned to one of four conditions for an intentional learning task. A free recall for incidental learning followed the attainment of the intentional criterion.

The investigators reported that the verbal list was learned quickly at each grade level. It was felt that the criterion score was not sensitive to age differences. Results indicated that inverse relationship between age and intentional learning, as defined here,

applies to a limited part of the age continuum. Learning was found to be greatest at the third grade and poorest at the sixth grade level.

Conclusions from the two experiments suggest there are differences of intentional and incidental learning for segments of the age continuum. Speed of verbal learning seems to increase from kindergarten to third grade and to decrease from the sixth to the ninth grade level.[24]

Seigel and Stevenson investigated developmental trends in incidental learning. The subjects in this study were children between the ages of seven and fourteen and adults. The purposes of the study were: 1) to determine the relationship of incidental learning as children develop ability to categorize, code, and label, and 2) to determine if the increase in age causes a decrease in attention to incidental stimuli and less incidental learning acquisition. The discrimination task to be learned employed a projector to show colored slides of common objects. The subject was then allowed up to seventy-two trials to learn the objects. The subject was then presented pictures of each stimulus object with two distractors. The criterion was the correct number of responses.

A comparison of age levels indicates a decline in performance from age twelve to thirteen and a further decline from age thirteen to fourteen. The decline between ages twelve and fourteen may be a tendency to disregard irrelevant stimuli and to focus on stimuli under direction. Adults performed higher than any of the children's groups,

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[24]John W. Deichmann, Mary B. Speltz, and Donald H. Kausler, "Developmental Trends in the Intentional and Incidental Learning Components of a Verbal Discrimination Task," Journal of Experimental Child Psychology, Vol. 11 (1971), pp. 21-24.

suggesting that the tasks were probably too simple. In conclusion, it appears that when the tasks become increasingly simple the greater the amount of incidental learning.[25]

Stevenson studied latent-learning in children to determine the relation of chronological age and the child's perception of the objects involved in the learning task. The subjects for the experiment were from age three to six years. The task involved perception, spatial orientation, and memory. The subject was given a pre-training period on how to use a key to unlock a box. The subject was then motivated to find a reward in a box which could only be opened with a key in a second box. Irrelevant objects were also in the second box. The child had to focus attention on the key, take it, and unlock the first box in order to obtain the reward.

Observational records were made of the behavior of each subject. It was reported that the older subjects followed instructions more rapidly and efficiently. Younger subjects tended to play. Older subjects were more interested in the reward, while to younger subjects the other items were of equal interest. They tended to manipulate and play with irrelevant objects rather than follow instructions. The experiment illustrates that with maturity latent-learning may be influenced by the momentary needs of the subject.[26]

Seigel and Corsini investigated incidental learning to determine the relation between age and the nature of the incidental stimuli.

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[25]Alexander W. Seigel and Harold W. Stevenson, "Incidental Learning: Developmental Study," Child Development, Vol. 37 (December, 1966), pp. 811-817.

[26]Harold W. Stevenson, "Latent Learning in Children," Journal of Experimental Psychology, Vol. 47, No. 1 (January, 1954), pp. 17-21.

The subjects were eight years old and fourteen years old. The experiment utilized three tasks: original learning, presentation of incidental stimuli and a test of incidental or intentional learning. Two measures were obtained from the last task, one for recognition and one for recall.

Results indicated that in both groups the subjects were successful in learning peripheral-central stimulus relations when the peripheral was associated with the central stimulus and instructions were given. Unless instructed, younger subjects did not observe or recall as efficiently. Both groups did less well when the peripheral stimuli was unrelated to the central theme. Therefore, it was concluded that the younger subjects show little incidental learning because of failure to attend to material unless instructed.[27]

The role of perceptual discrimination in the development of selecting information (relevant and irrelevant) was investigated by Druker and Hagen. The two hundred forty subjects were intellectually average, fourth, sixth, and eighth grade students. Approximately equal numbers of boys and girls were assigned to each group.

A memory task of two parts was used: a central and an incidental task. The central task involved a recognition activity on which eight trials were allowed. The score was the total number of correct responses on the eight trials. The incidental task was a matching activity. The score for incidental learning was based on the correct number of pairs of stimulus items recalled.

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[27]Alexander W. Seigel and David A. Corsini, "Attentional Differences in Children's Incidental Learning," Journal of Educational Psychology, Vol. 60, No. 1 (February, 1969), pp. 65-70.

Discriminability between the relevant and irrelevant items on each card was varied by changing the position of the items. The investigators developed four different types of arrangements, on the basis of these, subjects were assigned to one of the four groups for the central task.

A post-test questionnaire was given to all subjects after the incidental task. The questions were designed to yield information regarding how the subject approached the problem and cues determining his learning strategy. A coding method was developed for handling the information. The categories included rehearsal sequence (random or orderly); verbal encoding (labeling of relevant and irrelevant items); tendency to make thematic connections (or lack of tendency); and visual scanning (whole or part).

Of major interest in the results of the study, was the recall scores on both the central and incidental tasks. Findings indicated the central recall scores increased with age ($p < .01$). Incidental recall scores declined with age. Correlations between central and incidental recall and the IQ score were computed. There was a consistent, positive relationship between the central task recall score and IQ for subjects from both grade four and grade eight ($p < .05$ for both). No explanation was found for the lack of correlation for grade six. The correlation between the incidental recall score and IQ was small and insignificant.[28] The responses on the questionnaire indicated that rehearsal patterns and thematic associations were not

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[28] Joseph H. Druker and John W. Hagen, "Developmental Trends in the Processing of Task-Relevant and Task-Irrelevant Information," Child Development, Vol. 40, No. 2 (June, 1969), pp. 371-382.

accountable for selectivity in processing information. Verbal labeling and visual scanning were positively associated with age. These skills were characteristic of older subjects.

Ernest and Paivo investigated the relationship between imagery ability and sex differences in incidental recall. They used two experiments to obtain their data. The subjects used in the experiments were psychology students who had been given a battery of tests. Scores from the tests were used to rate the subjects as high, medium, or low imagers.

The first experiment employed words and pictures for recognition and recall. Color was used in the stimulus material but not emphasized in the instructions. The incidental recall task was the association of the correct color used in the words and pictures.

Results from this experiment indicated significant effects of sex. Females recalled more items than males; pictures were recalled more often than words; and recall improved with practice. High imagery males consistently recalled more items than low imagery males, the greatest difference was found with words. Low imagery females, on the other hand, recalled more words than high imagery females.

Subjects used in the second experiment of this study were psychology students who had not participated in the first experiment. Two groups were selected, equated on the following categories: number, sex, and level of imagery (high or low). The subjects were given an orienting test, the score for this was response on an item recognition. Incidental learning was measured by the correct number of responses on recall of the items.

Results revealed significant differences for imagery. High ima-

gery subjects recognized more items than low imagery subjects. In contrast to the first experiment, results of this experiment indicated that pictures were recognized less readily than words. Incidental learning was significantly higher for high imagery females than for high imagery males ($p < .001$).

The findings of this study indicated imagery ability was a significant factor in recognition and labeling of pictorial stimuli. It was suggested that memory, established through perceptual experiences and/or verbal labels were more available skills for high imagers than for low imagers.[29]

Hale, Miller, and Stevenson used film content in a developmental study of incidental learning. The subjects were elementary children in grades three through seven and college students. A short film was shown to the subjects as a reward for participation in an earlier test. The film was not presented as a testing device. Following the viewing each subject was given a test booklet with test items covering the content of the film. Incidental learning was based on the number of correct responses.

Results from the study indicate further evidence of a curvilinear relation between age and incidental learning. An increase in incidental learning was indicated between the third and sixth grades. A decline was found between the sixth and seventh grades. Girls scored consistently higher than boys in both grades. Sex differences were not found in the college age subjects. Sixth grade girls performed

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[29]Carole H. Ernest and Allan Paivo, "Imagery and Sex Differences in incidental Recall." British Journal of Psychology, Vol. 62, No. 1 (1971), pp. 67-72.

equally as well as college women while sixth grade boys performed significantly lower than college men.[30]

Saltzman employed an orienting task in an investigation of intentional and incidental learning. Subjects used were college students who were randomly assigned to one of two groups: incidental learning or intentional learning.

The subjects were given a sorting task and instructed to complete three trials. The intentional group was tested for recall. All subjects were then given three more trials. The intentional group was instructed to learn the material. No significant differences were found for the two groups indicating that when both groups were given the orienting task, the intentional learning did not exceed the incidental learning.[31]

Saltzman and Atkinson compared incidental and intentional learning to determine the effect of the number of presentations of the stimuli material on learning. College students were randomly assigned to one of the two conditions. Time of the presentation was held constant but the number of presentations varied with two, six, eight, or sixteen repetitions. The stimulus material consisted of two digit numbers. The incidental group was instructed to code the numbers, the intentional group was instructed to learn the numbers. Significant differences were found between incidental and intentional learning after

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[30]Gordon A. Hale, Leon K. Miller, and Harold Stevenson, "Incidental Learning of Film Content: A Development Study," Child Development, Vol. 39, No. 1 (March, 1968), pp. 69-77.

[31]Irving J. Saltzman, "The Orienting Task in Incidental Learning and Intentional Learning," American Journal of Psychology, Vol. 66, No. 4 (October, 1958), pp. 593-597.

sixteen presentations. Intentional learning improved with practice but incidental learning did not.[32]

Further investigation of the effects of exercise on intentional and incidental learning was done by Postman and Adams. Frequencies of one, two, four, eight, and sixteen presentations were used with twenty-four nonsense syllables on the first experiment of the study. Intentional learners performed significantly higher on recall as a function of exercise whereas incidental learners did not.

The second experiment of the study varied the number of items to be learned (24, 36, or 48 nonsense syllables or adjectives). The recall of the intentional group decreased as the length of the list of syllables increased but the incidental group was not affected. There was a decline in performance for both groups as the length of the list of adjectives increased. Results of this study indicate that incidental learners do not benefit as well as intentional learners with increased frequency of presentation.[33]

Brown investigated a number of factors influencing incidental learning. The learning material for his experiment included twelve nonsense syllables and twelve words which were presented on a memory drum. The rate of exposure was two seconds. The criterion was the number of correct responses.

One hundred sixty college students were assigned to the experi-

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[32]I. J. Saltzman and Rita Atkinson, "Comparisons of Incidental and Intentional Learning After Different Numbers of Stimulus Presentations," American Journal of Psychology, Vol. 67 (1954), pp. 521-524.

[33]Leo Postman and Pauline Austin Adams, "Studies in Incidental Learning: VII. Effects of Frequency of Exercise and Length of the List," Journal of Experimental Psychology, Vol. 56, No. 1 (1958) pp. 86-94.

mental (incidental learning) or the control (intentional learning) group. Random assignment was then made to the following groups: 1) nature of instruction (initial or delayed), 2) nature of material (words or nonsense syllables), and 3) number of presentations, (four or eight).

Results indicated that intentional learning was superior to incidental learning under all conditions. Words were no easier to learn than syllables under incidental learning conditions but were superior under intentional learning conditions. Eight presentations of materials yielded more learning than four with both intentional and incidental learning. When instructions are delayed, less learning occurred, however, a spurt of learning immediately followed the introduction of instructions to those groups.[34]

Summary

Many of the investigations on incidental learning of the mentally retarded have looked for differences between the mentally retarded and normal subjects matched on mental age or chronological age. Other variables studied in relation to these groups have been the orientation to the incidental learning task, the difficulty and complexity of the task, retention and recall of learning, and different types of reinforcement. Some of these studies have reported evidence of an incidental learning deficit among the mentally retarded while others have not.

Research employing populations of mentally retarded subjects has

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[34]George Haskell Brown, "Factors Influencing Incidental Learning," Journal of Experimental Psychology, Vol. 47 (1954), pp. 163-169.

been limited due to the problems involved in locating adequate sampling. Therefore, a number of investigations employing normal subjects were reviewed. Several studies of normal populations have reported a curvilinear relation between age and incidental learning. Developmental trends tend to indicate less acquisition to incidental learning during the pre-school and early adolescent years. Studies utilizing sex as the variable have reported differences in the performance of male and female subjects. Other factors investigated have been orientation to the task, speed of presentation of stimuli material and task complexity. Differences between and among normal subjects have been reported in these studies. Investigations employing normal subjects cannot be used as a reliable basis for predicting learning behavior of the mentally retarded. They do, however, provide a background regarding the type of research that has been done in incidental learning and possibly add to the information needed by those who work with the mentally retarded in learning situations.

CHAPTER III

DESIGN AND METHODOLOGY

Introduction

This chapter contains a description of the population used in the study and how the subjects were selected. The materials and how they were used to obtain the data are described. The hypotheses and statistical treatment are presented.

Population

Sixty subjects were used in this study. All subjects were enrolled in a public school of a large, county school system. All subjects had been given a battery of tests by qualified school personnel.

Thirty subjects were selected from classes for the educable mentally retarded. Selection was based on the following criteria: intelligence quotient (IQ) within the 50-75 range as measured by the Wechsler Intelligence Scale for Children (WISC); chronological age, at the time of the experiment, within the range of twelve and thirteen years; free of gross sensory and/or motor defects; and classified as educable mentally retarded. These subjects constituted Groups A_1 and A_2.

Thirty subjects were selected from regular classes for the intellectually average. Selection was based on the following criteria: intelligence quotient (IQ) within the 90-110 range as measured on the

Wechsler Intelligence Scale for Children (WISC); chronological age, at the time of the experiment, within the range of twelve and thirteen years; free of gross sensory and/or motor defects; and classified as intellectually average. These subjects constituted Groups B_1 and B_2.

The subjects in Groups A_1 and A_2 were selected from a list of one hundred forty-seven students based on information from enrollment records of classes for the educable mentally retarded. The list compiled for purposes of this study included only those students whose chronological ages were between twelve and thirteen years (fifteen or more days were counted as one month), and those who had been evaluated by a trained examiner with the WISC. Thirty subjects were selected from this list employing a table of random digits.[35]

The subjects in Groups B_1 and B_2 were selected by obtaining a list of one hundred eighty-two students whose chronological ages were between twelve and thirteen years (fifteen or more days were counted as one month), and who had been evaluated by a trained examiner with the WISC. Intellectual classification had been reported to be within the average range (90-110). These subjects were enrolled in regular classes. Thirty subjects were selected from this list employing a table of random digits.[36]

Each of the two groups were then sub-divided into two equal groups with fifteen subjects in each utilizing the same method of randomization.[37]

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[35] Robert G. D. Steel and James H. Torrie, Principles and Procedures of Statistics. (New York, 1960), pp. 428-431.

[36] Ibid., Steel.

[37] Ibid., Steel.

The subjects in Groups A_1 and B_1 were assigned to the readiness treatment group. The subjects in Groups A_2 and B_2 were assigned to the non-readiness treatment group. This provided for fifteen educable mentally retarded and fifteen intellectually average subjects in the readiness treatment group; and fifteen educable mentally retarded and fifteen intellectually average subjects in the non-readiness treatment group. (See Appendix A).

Parental consent was obtained by the school according to local policy. This was to ascertain that the parents were aware of and consented to having their child participate in this study. (See Appendix C).

Materials

Number Recognition Card

The number recognition card was used as a screening device to ascertain knowledge of numbers and ability to read numbers one through ten (1-10). The number recognition card was made of white poster paper (2 x 20 inches). Ten gray circles, one and one-half (1½) inches in diameter were spaced one-half (½) inch apart on the card. Number symbols, in numerical order, one through ten (1-10) were printed in black on the circles. All subjects were presented the card as a quick, screening device for number knowledge.

Readiness Materials

Ten items were selected for the readiness activity. The items consisted of models of common objects including: hand mirror, globe, airplane, dog, hat, football, motor bike, boat, chair, and television

set. The hand mirror was purchased at a cosmetics counter, while the chair and television set were made in a shop class. The hand mirror, airplane, dog, motor bike, and boat were made of brightly colored plastic. The hat was made of plastic but painted a flat black in order to appear more realistic. The globe was made of metal and the football of rubber. The chair and television set were made of wood and were appropriately painted.

Formboard I

Formboard I was eighteen by twenty (18 x 20) inches made of three-fourths (3/4) inch plywood. The formboard was painted flat white and backed with flannel. Ten depressions, each one and one-half (1½) inches in diameter, were placed in a random order on the board so there were approximately four (4) inches between each depression. Artists' drawings of each of the ten models, (previously described) were placed to the left of the depressions. The drawings were approximately two inches by two inches (2 x 2). Black dots indicating a number value, one through ten (1-10), were placed to the right of each depression. The dots were not placed in numerical sequence. All sixty subjects used Formboard I.

Formboard II

Formboard II was eighteen by twenty (18 x 20) inches made of three-fourths (3/4) inch plywood. The formboard was painted flat white and backed with flannel. Ten depressions, each one and one-half (1½) inches in diameter, were placed in random order (but not the same as Formboard I) on the board so there were approximately four

(4) inches between each depression. Artists' drawings of each of the models, previously described, were placed to the left of each depression. All sixty subjects used Formboard II.

Wooden Discs

A set of ten wooden discs, one and three-eighths (1 3/8) inches in diameter and one-half (½) inch thick were provided for use with both Formboard I and Formboard II. Each disc had a number symbol printed on it, one through ten (1-10). The discs were painted gray, the numbers printed in black. (See Appendix B).

Testing Procedure

The subjects were treated individually. All subjects were given the number recognition screening test (1 through 10) to ascertain number knowledge. Subjects unable to pass the screening test would have been eliminated from the study.

The thirty subjects in the readiness group (Groups A_1 and B_1) were given a fifteen minute readiness activity employing the ten models (hand mirror, globe, airplane, dog, hat, football, motor bike, boat, chair, and television set). The readiness activity consisted of presenting the model as follows:

"What is this?"

"Yes, it is a _____."

"What is its use?"

"Have you ever seen (had, rode, etc.) a _____?"

"Would you like to look at this model?"

Each subject was given an opportunity to hold and examine the

model. Dialogue initiated by the subject was not ignored, however, the line of questioning and discussion was re-directed to the outline in order to provide each subject an equal exposure of the stimuli.

All subjects (sixty) in the study were given Formboard I on which there were ten depressions. An artist's drawing of one of the models was placed to the left of the depression and a set of dots representing a number between one and ten (1-10) was placed on the right. This formboard was placed directly in front of the subject. The numbered discs were placed at the bottom of the formboard immediately in front of the subject. The subjects were instructed to place the numbered discs in the depression (hole) beside the corresponding number of dots. No reference was made to the models which had been used in the readiness activity or to the drawings which were present on the formboard.

The examiner provided assistance for the subject as needed. This formboard was used by each subject until all of the discs had been correctly placed by the subject three times. After the third successful trial, Formboard I was removed from the subject's sight.

Formboard I provided the intentional learning task which was the matching of numbers (one through ten) to the corresponding set of dots. The incidental learning stimuli was provided through the artists' drawings of the models beside the depressions on the formboard.

All subjects (sixty) were given Formboard II. The method of presentation and placement before the subject followed that outlined for Formboard I. Formboard II had ten depressions with an artists' drawings to the left of each depression. The subjects were asked to match the numbered disc to the appropriate drawing as had appeared on

Formboard I.

The incidental learning was recorded by the correct number of responses. A correct response was the correct association of the number to the drawing.

Five minutes were allowed to complete the task. At the end of four minutes the subject was told by the examiner, "You have a little more time." If the subject had not quit working at the expiration of the five minute period, he was asked to stop.

Statistical Procedure

The hypotheses were tested by subjecting the data to a two by two (2 x 2) factorial design. The level of significance was set at .05. The subjects were randomly assigned to the readiness or non-readiness group. (See Table I). The columns represent the treatment, readiness or non-readiness. The rows represent the level of intelligence, educable mentally retarded or intellectually average.

TABLE I

TREATMENT GROUPS

Level of Intelligence	Readiness	Non-readiness
Educable mentally retarded	15 Subjects A_1	15 Subjects A_2
Intellectually average	15 Subjects B_1	15 Subjects B_2

Raw score data, amount of incidental learning as indicated by correct number of responses, were obtained. The Oklahoma State University Computer Center performed the analysis.

CHAPTER IV

ANALYSIS OF THE DATA

Introduction

The purpose of this study was two-fold: 1) to determine if there was a difference between educable mentally retarded and intellectually average children who had been given a readiness activity for incidental learning and those who had not; and 2) to determine if there was a difference between the ability of educable mentally retarded and intellectually normal children to learn incidently on a specific task.

The subjects in this study were enrolled in twenty-three schools of a large county school system. They were selected to fall within one of two intellectual levels and within a chronological age range. The age range for all subjects used in this study was twelve through thirteen years. The subjects in Group A had intelligence quotients within the 50-75 intellectual range. The mean intelligence quotient for group A was 61.5; the mean chronological age in months was 153.3. The subjects in Group B had intelligence quotients within the 90-110 intellectual range. The mean intelligence quotient was 100.2; the mean chronological age was 155.5 months. (See Table II).

The subjects in each of the intellectual groups were randomly assigned to the readiness or non-readiness treatment group. Subjects having the readiness activity were assigned to Groups A_1 and B_1. Subjects not having the readiness activity were assigned to Groups A_2

and B_2. Table III gives the means and ranges for the chronological ages and intelligence quotients for each of the groups.

TABLE II

MEAN AND RANGE OF CHRONOLOGICAL AGE AND INTELLIGENCE QUOTIENT FOR GROUPS A AND B

Groups	CA in months		Intelligence Quotient	
	Mean	Range	Mean	Range
A (N=30)	153.3	144-167	61.5	50-75
B (N=30)	155.5	144-167	100.2	90-109

TABLE III*

MEAN AND RANGE OF CHRONOLOGICAL AGE AND INTELLIGENCE QUOTIENT FOR THE SUB-GROUPS

Groups	CA in months		Intelligence Quotient	
	Mean	Range	Mean	Range
A_1 (N=15)	155.5	144-167	61.6	50-73
A_2 (N=15)	151.5	145-160	61.5	53-75
B_1 (N=15)	155.5	144-167	99.0	90-109
B_2 (N=15)	155.8	148-167	101.4	91-109

* (See Appendix A for specific data on each subject in the study.)

Criterion Test Results

In order to determine the effect of a readiness activity on the amount of incidental learning, educable mentally retarded and intellectually average subjects were assigned to readiness or non-readiness treatment conditions. Intentional and incidental learning tasks were provided for the subjects assigned to each treatment condition. The learning tasks were immediately followed by a test for incidental learning. The criterion was the number of correct responses. Performance records of the subjects by treatment groups are in Appendix A.

Criterion data presented in Table IV was computed from the raw scores obtained on the incidental learning test for each intellectual level.

TABLE IV

CRITERION DATA FOR INTELLECTUAL LEVELS: EDUCABLE MENTALLY RETARDED AND INTELLECTUALLY AVERAGE

Level of Intelligence	Number of Subjects	Treatment	Mean	Standard Deviation	Range*
Educable Mentally Retarded	N = 30	A_1, A_2	1.8333	1.3412	0-4
Intellectually Average	N = 30	B_1, B_2	4.1000	1.1552	2-6

*Possible range 0-10.

Criterion data presented in Table V was computed from the raw scores obtained on the incidental learning test. This table gives information for each of the treatment conditions and for each intellectual level.

The ten items on the incidental learning test included: hand mirror, globe, airplane, dog, hat, football, motor bike, boat, chair, and television set. An analysis of the response to each item was made for the sixty subjects in the study. Appendix E provides tables presenting the frequency of response in number and percentage. No stimulus item was answered correctly by all subjects and no stimulus item was missed by all subjects. The first item, hand mirror, and the last item, television set, received the most correct responses (hand mirror: frequency = 31; percentage = 52.24)(television set: frequency = 26; percentage = 44.07). Football (6) and motor bike (7) were next in order of correct response with percentages of correct response 31.67 and 25.86 respectfully. See Appendix E for details.

Testing the Hypotheses

The hypotheses were tested by the analysis of variance factorial design. The variables analyzed were: the effect of readiness, the level of intelligence, and the amount of incidental learning.

Hypothesis I stated that there would be no statistically significant difference in the effect of readiness on the amount of incidental learning. In order to test this hypothesis the F ratio was computed showing the overall effect of readiness on the amount of incidental learning. The F ratio of 6.6207 was found to be significant at the .025 level of confidence indicating that in only twenty-five cases out

of a thousand would a difference this great occur by chance alone. (See Table VI for summary of data). Since the level of confidence for this study was set at .05, Hypothesis I was rejected. The rejection of the hypothesis provides evidence that, for this population, a statistically significant difference exists between the effect of a readiness activity and the amount of incidental learning.

TABLE V

CRITERION DATA FOR TREATMENT CONDITIONS

Level of intelligence	Treatment								
	Readiness				Non-Readiness				
	Group	Range	Standard Deviation	Mean	Group	Range	Standard Deviation	Mean	Row Mean
Educable Mentally Retarded	A_1 N=15	0-4	1.3732	2.2000	A_2 N=15	0-4	1.2459	1.4667	1.8334
Intellectually Average	B_1 N=15	3-6	0.8338	4.5333	B_2 N=15	2-5	1.2910	3.6667	4.1000
Column Mean				3.3667				2.5667	2.9667

Hypothesis II stated that there would be no statistically significant difference in the effect of the level of intelligence on the amount of incidental learning. In order to test this hypothesis the F ratio was computed showing the overall effect of the level of intelligence on the amount of incidental learning. The F ratio of 53.1497 was obtained indicating a very high level of significance ($<.001$), therefore, since the level of confidence for this study was set at .05, Hypothesis II was rejected. The rejection of the hypothesis provides evidence that, for this population, there a statistically significant difference exists between the level of intelligence and incidental learning. (See Table VI for summary of data).

TABLE VI

SUMMARY TABLE FOR ANALYSIS

Source of Variance	degrees of freedom	sum of squares	mean squares	F ratio
Treatments	1	9.6000	9.6000	6.6207
Levels	1	77.0666	77.0666	53.1497
Treatments by Levels	1	0.0664	0.0664	0.0458
Within Cells	56	81.1966	1.4499	
Total	59	167.9327		

Hypothesis III stated that the amount of incidental learning would not be significantly influenced by the interaction of readiness and intelligence. In order to test this hypothesis the F ratio was computed showing the interaction between the treatments and the levels of intelligence. The test for interaction yielded F ratio of .0458 which indicated no statistically significant difference. Since the level of confidence for this study was set at .05, an F ratio of 4.00 was required, therefore, Hypothesis III was accepted.[38] The acceptance of the hypothesis provides evidence, for this population, that the interaction of readiness and intelligence was nonsignificant.

Summary

Data obtained for this study was concerned with incidental learning. Two readiness conditions (readiness and non-readiness) and two levels of intelligence (educable mentally retarded and intellectually average) were investigated. This chapter presented an analysis of the criterion data in terms of means, standard deviations, and range for the subjects in the study. The items selected for the criterion test were analyzed in terms of frequency and percentages of response. The hypotheses were tested. Significant relationships were found in the effect of readiness and the amount of incidental learning ($p < .05$). The amount of incidental learning and the level of intelligence were found to be highly significant ($p < .05$). However, the test for interaction between readiness and intelligence indicated no significant relations.

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[38] James L. Bruning and B. L. Kintz, Computational Handbook of Statistics, (Glenview, Ill., 1968), pp. 16-30 and p. 225.

CHAPTER V

SUMMARY AND RECOMMENDATIONS

Introduction

This chapter will discuss the findings of this study regarding the relationship of incidental learning and level of intelligence. A summary and recommendations will be included.

Summary

The purpose of this investigation was to determine if there was a difference between the ability of educable mentally retarded and intellectually average subjects to learn incidentally on a specific task, and to determine if there was a difference in the amount of incidental learning when a readiness activity was utilized. The stated hypotheses that no significant differences existed were treated statistically utilizing an analysis of variance factorial design (two by two).

The population used in this study was enrolled in twenty-three different schools in a large county system. A table of random digits was employed in the selection of all subjects and assignment treatment groups. Thirty educable mentally retarded subjects were selected on the following criterion: twelve through thirteen years of age; evaluated on WISC and classified as educable mentally retarded; and enrolled in a class for educable mentally retarded children. Random

selection of the thirty subjects used in the study was made from a list of one hundred forty-seven students who met the above criteria.

Thirty intellectually average subjects were selected on the following criterion: twelve through thirteen years of age; evaluated on WISC and classified as intellectually average; and enrolled in a class for normal students. Random selection of the thirty subjects used in this study was made from a list of one hundred eighty-two students who met the above criterion.

Fifteen subjects from each intellectual level were randomly assigned to the readiness treatment condition. The remaining fifteen from each intellectual level were assigned to the non-readiness groups.

The subjects were seen individually, those assigned to readiness groups were given a readiness activity in order to familiarize them with learning materials to be used in the learning task. All subjects were given an intentional learning task and an incidental learning task.

The criterion was the score obtained by the subject on the incidental learning task. The data was analyzed by a two by two factorial design.

The major concerns of this study were the effects of readiness and intelligence on incidental learning. Findings here indicate that readiness is an important factor in incidental learning for both educable mentally retarded and intellectually average subjects. Subjects who received the readiness activity performed significantly better than subjects who did not receive the readiness activity ($< .05$). The level of intelligence was found to be statistically significant

in the amount of incidental learning acquired. Average subjects performed at a higher level than educable mentally retarded subjects ($p < .05$). The interaction between readiness and intelligence indicated no significance for this population.

An underlying assumption of this study was that readiness is necessary for learning to occur and that it will occur more rapidly if the subject is familiar with the materials to be learned. The implication here is that readiness programs are an important part in the learning program for both educable mentally retarded and intellectually average subjects.

Recommendations

The following recommendations were made from the interpretations of findings in this study. The recommendations pertain only to populations from which the sample in this study would be considered representative.

1. Readiness activities should continue to be a part of the curriculum in school programs and should extend beyond primary grades.
2. Teachers can rely on incidental learning as well as intentional learning in teaching skills and concepts if readiness is provided.
3. Teachers of the educable mentally retarded can increase the amount of incidental learning by helping increase the child's skill of observation through readiness activities.
4. Additional research should be done investigating the behavior of children during the learning process in the classroom.

5. Additional research should be done on the practical aspects of the use of incidental learning in the classroom.
6. Further research should be done to investigate the interaction of readiness and intelligence in incidental learning.
7. Additional research should be done to determine the significance of incidental learning in other classifications of exceptional children.

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APPENDIX A

SUBJECT DATA

READINESS GROUP A_1

Intelligence Quotient*	Chronological Age in Months	Sex	Incidental Learning Score
66	165	M	4
50	166	M	4
63	154	F	4
73	144	F	4
52	158	F	3
70	144	F	2
61	167	M	2
56	146	F	2
58	152	M	2
72	153	F	2
52	147	M	2
57	154	F	1
62	153	M	1
72	156	M	0
60	167	M	0

*Wechsler Intelligence Scale for Children: Full Scale Intelligence Quotient (F/S IQ)

NON-READINESS GROUP A_2

Intelligence Quotient*	Chronological Age in Months	Sex	Incidental Learning Score
62	149	M	4
75	146	M	3
63	152	F	3
70	147	F	2
56	153	M	2
63	157	M	2
69	145	M	1
55	153	M	1
53	160	F	1
55	156	F	1
64	145	F	1
57	158	F	0
64	158	M	0
54	148	M	0
62	146	F	0

*Wechsler Intelligence Scale for Children: Full Scale Intelligence Quotient (F/S IQ)

READINESS GROUP B_1

Intelligence Quotient*	Chronological Age in Months	Sex	Incidental Learning Score
102	154	M	6
98	150	F	6
97	148	M	5
107	144	M	5
92	152	M	5
108	151	M	5
109	167	F	5
109	155	M	4
101	163	M	4
98	149	M	4
98	160	M	4
93	163	F	4
91	161	F	4
90	158	M	4
93	154	F	3

*Wechsler Intelligence Scale for Children: Full Scale Intelligence Quotient (F/S IQ)

NON-READINESS GROUP B_2

Intelligence Quotient*	Chronological Age in Months	Sex	Incidental Learning Score
105	160	F	5
103	149	M	5
107	150	M	5
96	155	F	5
91	166	F	5
102	158	F	5
103	151	M	4
103	167	F	4
92	148	M	3
105	150	M	3
107	159	F	3
109	155	M	2
98	148	F	2
104	155	F	2
97	166	F	2

*Wechsler Intelligence Scale for Children: Full Scale Intelligence Quotient (F/S IQ)

APPENDIX B

MATERIALS USED

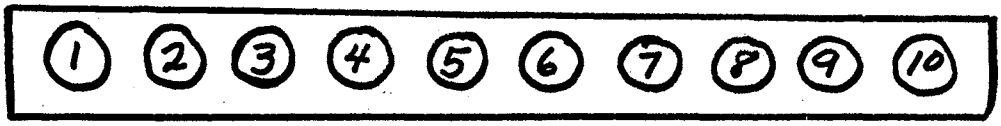

Figure 1. Number Recognition Card

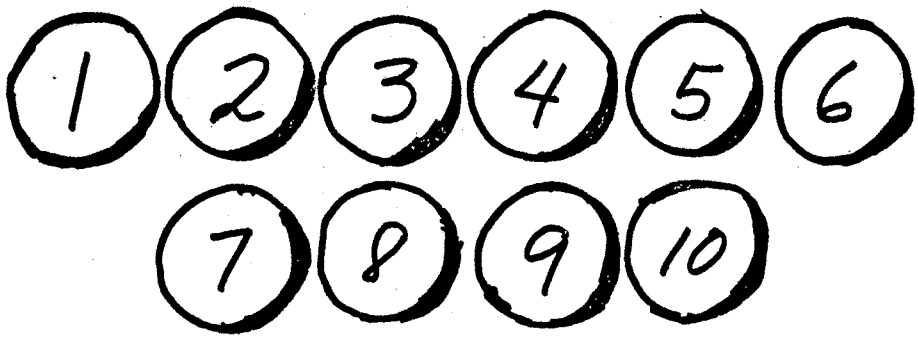

Figure 2. Ten Wooden Discs
(Used with Formboards I and II).

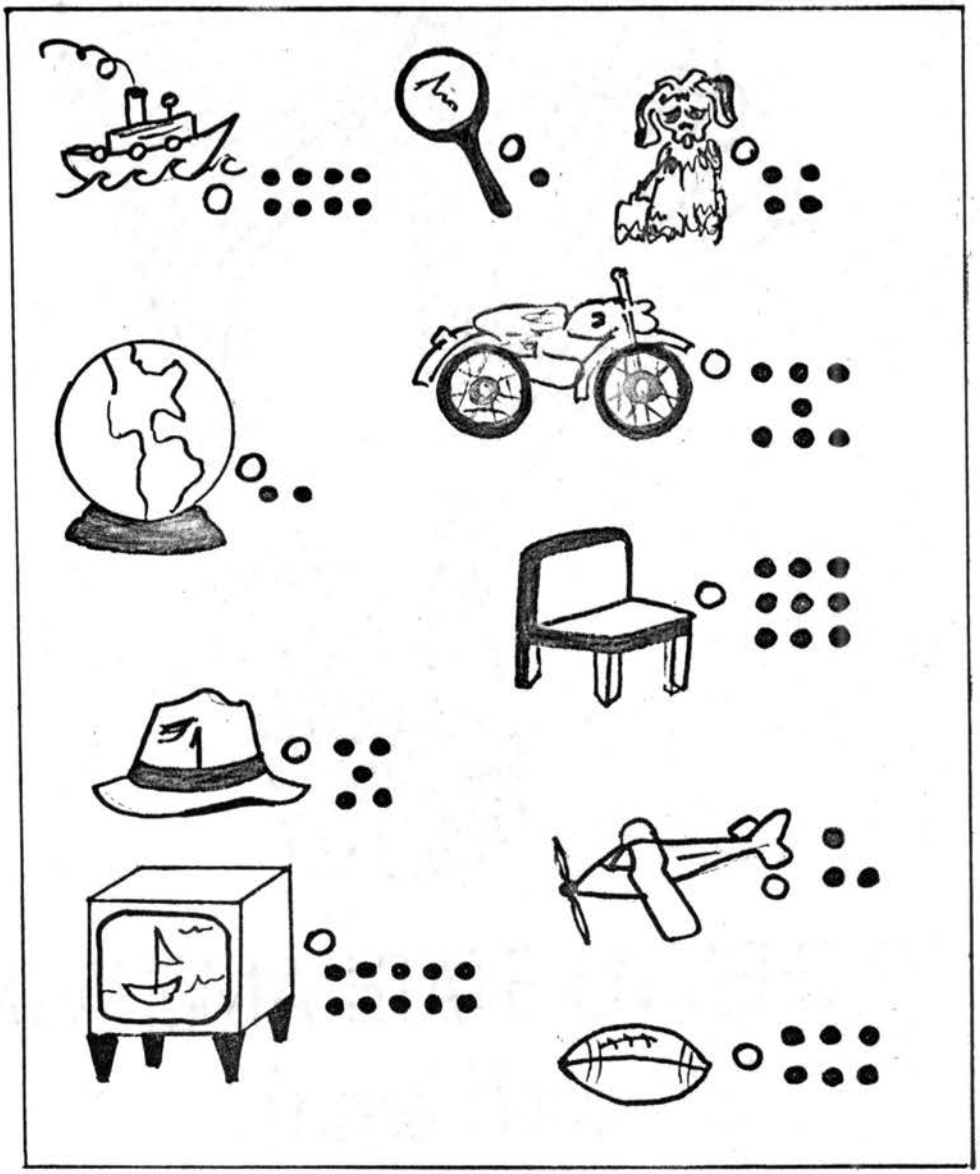

Figure 3. Formboard I

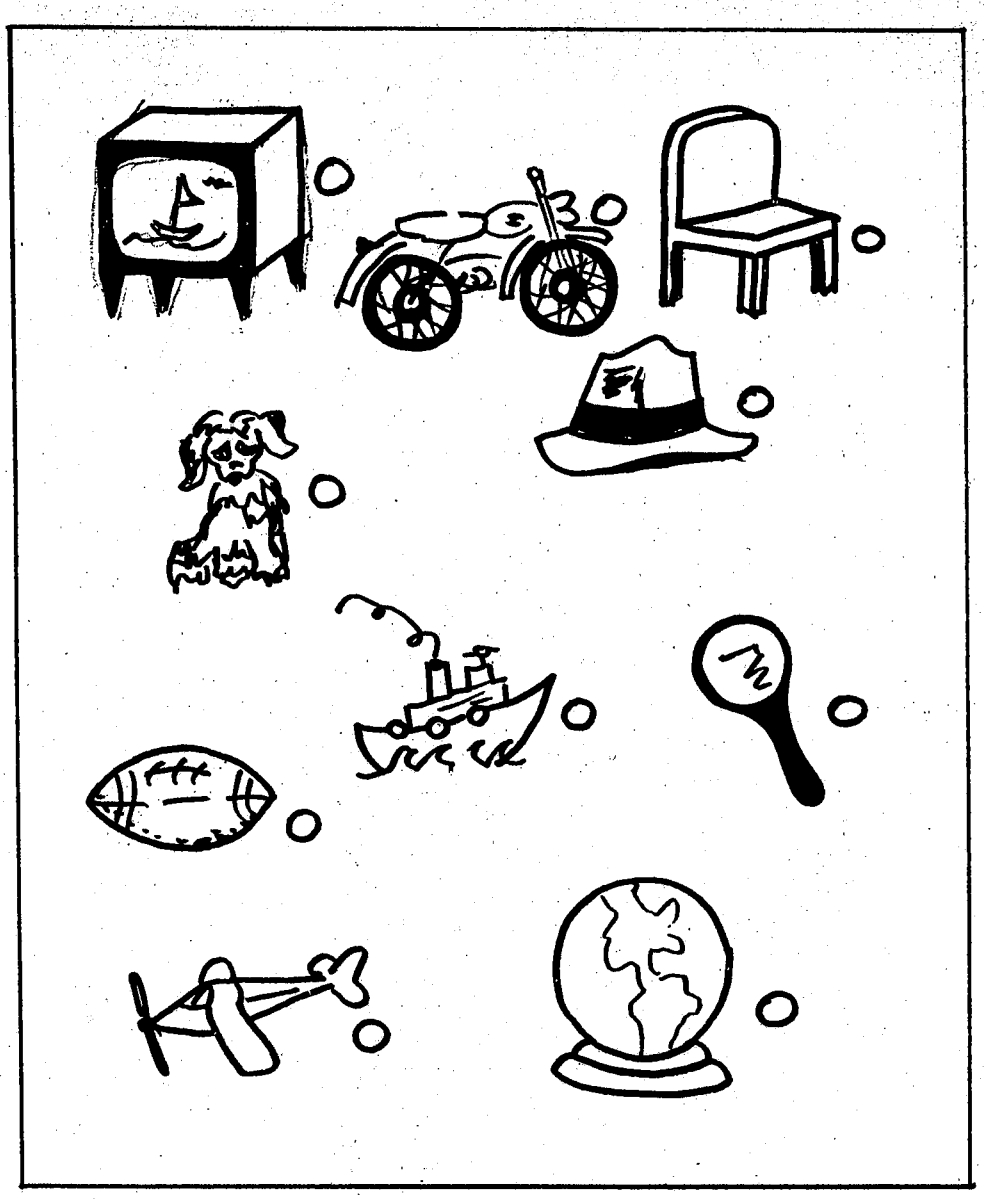

Figure 4. Formboard II

APPENDIX C

RECORDS FOR INDIVIDUAL SUBJECTS

Palm Beach County Public Schools
West Palm Beach, Florida

TO: (Parent or guardian of subject)

FROM: (Principal of local school and/or Radine Frisbie, ECE)

Your child has been selected to participate in a research project regarding how children learn. All information will be confidential.

If you are willing, please sign.

_____

Parent or Guardian

Experimental Data: Effects of Readiness on Incident Learning on EMR and Average Children

I. Name * _____ Age _____

School _____ School Placement _____

II. Test _____ Test score _____

III. Experimental Group (circle one) A_1-(EMR-R) A_2-(EMR-NR)

B_1-(Ave.-R) B_2-(Ave.-NR)

IV. Performance Record (+ correct - incorrect)

A. Formboard I

Item	Trial 1	Trial 2	Trial 3
1. Hand mirror			
2. globe			
3. airplane			
4. dog			
5. hat			
6. football			
7. motor bike			
8. boat			
9. chair			
10. television			

B. Formboard II

Item	Response	+/-
1. Hand mirror		
2. globe		
3. airplane		
4. dog		
5. hat		
6. football		
7. motor bike		
8. boat		
9. chair		
10. television		

Score _____

Date tested _____

Examiner _____

*Subject's name was blacked out after testing to insure confidentiality of records.

APPENDIX D

DIALOGUE USED TO TEST SUBJECTS

Testing Outline for Examiner

Number Recognition:

"We are going to play some games, however, before we begin please read these numbers for me."

Readiness Activity:

1) "What is this?" - Subject's response.

2) "Yes, it is a mirror."

3) "How is this kind of mirror generally used?" - Subject's response.

4) "Do you have a mirror like this?" Male subjects, "Does your mother (or sister) have one like this?" - Subject's response.

5) "Would you like to look at this mirror?"

Items were presented to each subject in the same order as follows:

(1) hand mirror
(2) globe
(3) airplane
(4) dog
(5) hat
(6) football
(7) motor bike
(8) boat
(9) chair
(10) television set

Question number five should be varied in the presentation to fit the item. For example, for "football," male subjects may be asked if they enjoyed playing football, etc. (Time limit: 15 minutes). Formboard I - intentional learning task: "Here is a puzzle. You see there are numbers on these discs (checkers). There are sets of dots beside the holes. You match the number to the correct set of dots. If you do not understand, I will help you." (Assistance to be provided as needed). After a correct response is achieved, "That was very good,

however, I am going to take the numbers (discs) out so you may do it again." Following the second correct trial, "You are doing very well, but let's do this once more." (When the subject appears to be aware of the possibility of timing), "Take your time. You are doing quite well." After the third successful trial, remove Formboard I. Secure from subject's view. Leave wooden discs in front of the subject. Formboard II - incidental learning task: "Here is another puzzle. It looks very much like the first one, but it is different in some ways. You may have noticed the last puzzle had pictures on it as well as sets of dots. Last time you matched the numbers to the correct (right) set of dots. This time you are to match the number to the picture. Try to remember as many as you can." (Time limit: 5 minutes). Check watch, after four minutes have expired say, "You have a little more time." When five minutes are up, "You did very well. Thank you for playing this game with me."

APPENDIX E

ANALYSIS OF CRITERION ITEMS

FREQUENCY TABLE - FORMBOARD II RESPONSES

Test Item	1 mirror	2 globe	3 plane	4 dog	5 hat	6 ball	7 bike	8 boat	9 chair	10 T.V.	Blank
1. hand mirror	31	1	8	6	2	2	2	3	1	3	1
2. globe	5	17	6	5	2	7	3	5	8	1	1
3. plane	6	3	7	7	7	4	6	5	5	8	2
4. dog	4	14	1	15	10	2	3	4	7	0	0
5. hat	1	7	9	5	15	7	10	2	0	2	2
6. foot-ball	1	5	5	2	7	22	4	4	4	4	2
7. motor bike	3	5	6	3	7	4	19	6	4	3	0
8. boat	1	2	7	2	4	5	5	15	12	7	0
9. chair	7	3	5	10	4	4	3	8	11	4	1
10. T.V.	1	2	5	4	1	1	4	8	7	26	1

PERCENTAGE TABLE - FORMBOARD II RESPONSES

Test Item	1 mirror	2 globe	3 plane	4 dog	5 hat	6 ball	7 bike	8 boat	9 chair	10 T.V.
1. hand mirror	52.54	1.69	13.56	10.17	3.39	3.39	3.39	5.08	1.69	5.08
2. globe	8.47	28.81	10.17	8.47	3.39	11.86	5.08	8.47	13.56	1.69
3. plane	10.34	5.17	12.07	12.07	12.07	6.90	10.34	8.62	8.62	13.79
4. dog	6.67	23.33	1.67	25.00	16.67	3.33	5.00	6.67	11.67	0.0
5. hat	1.72	12.07	15.52	8.62	25.86	12.07	17.24	3.45	0.0	3.45
6. foot-ball	1.72	8.62	8.62	3.45	12.07	37.93	6.90	6.90	6.90	6.90
7. motor bike	5.00	8.33	10.00	5.00	11.67	6.67	31.67	10.00	6.67	5.00
8. boat	1.67	3.33	11.67	3.33	6.67	8.33	8.33	25.00	20.00	11.67
9. chair	11.86	5.08	8.47	16.95	6.78	6.78	5.08	13.56	18.64	6.78
10. T.V.	1.69	3.39	8.47	6.78	1.69	1.69	6.78	13.56	11.86	44.07

VITA

Opal Radine Frisbie

Candidate for the Degree of

Doctor of Education

Thesis: EFFECTS OF READINESS ON INCIDENTAL LEARNING IN EDUCABLE MENTALLY RETARDED AND INTELLECTUALLY AVERAGE CHILDREN

Major Field: Elementary Education

Biographical:

Personal Data: Born near Afton, Oklahoma, February 11, 1927, the daughter of George W. and Willa F. Roberson.

Education: Graduated from Grove High School, Grove, Oklahoma in 1944; received Bachelor of Science degree from Kansas State College, Pittsburg, Kansas with a major in elementary education in June, 1957; received Master of Science degree from Oklahoma State University, Stillwater, Oklahoma with a major in education, emphasis in guidance and counseling, in June, 1964; completed requirements for the Doctor of Education degree from Oklahoma State University, Stillwater, Oklahoma in July, 1972.

Professional Experience: Teacher in one-room school with grades one through eight, Pleasant Valley School, Cherokee County, Kansas, 1954-1955; teacher in one-room school with grades one through eight, Jarrett School, Cherokee County, Kansas, 1955-1956; fourth grade teacher, 1960-1963 in Miami Public Schools, Miami, Oklahoma; teacher of educable mentally retarded children, intermediate level, at Royal Palm School, Palm Beach County Schools, West Palm Beach, Florida, 1964-1965; psychometrist assigned to Exceptional Child Education, Palm Beach County, Florida, 1965-1966; Coordinator of Placement, Exceptional Child Education, Palm Beach County Schools, Palm Beach County, Florida, 1966-1969; graduate assistant, teaching courses in special education at Oklahoma State University, Stillwater, Oklahoma, 1969-1970; instructor teaching courses in special education and elementary education at Oklahoma State University, Stillwater, Oklahoma, 1970-1971; planner-developer in a federal planning grant, "Focus on the Intellectually Disabled," Palm Beach County Schools, Palm Beach County, Florida, 1971-1972.