PARENT EDUCATION AS IT INFLUENCES THE CHILD'S COGNITIVE DEVELOPMENT

by

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ABSTRACT

The purpose of this investigation was to determine the degree to which parents could be taught to facilitate the cognitive development of their children in one area, the ability to conserve. A secondary purpose was to identify the characteristics of those parents who were successful in the role of their child's teacher. Twenty-six preschool-age children, and the parents of thirteen of the children served as subjects for the study.

The children whose parents participated in the three weekly training sessions made large gains in their ability to conserve in nine out of thirteen cases. The remaining four children in the experimental group remained at, or regressed from, their pretest scores by the conclusion of the study.

A tentative characterization of the ideal parent-educator on the basis of this study would include patience, respect for individuality, a warm relationship with the child at the onset of the study, high level of parental education, as well as enthusiasm and flexibility on the part of the parent.

The findings of the study suggest that, for the most part, parents who receive a minimum amount of training can influence their children's cognitive development positively.
INTRODUCTION

Each year increasing numbers of children come to school ill-prepared to cope with the demands of an academic institution. Not only do they lack the cognitive skills necessary for success, but many fear and mistrust the people traditionally associated with the school. As Martin Deutsch (1960, p. 3) stated, "School is an experience which...is discontinuous with the values, preparation, and experience the child receives from home and particular community; it represents society's demand that children bridge social class orientations for a few hours a day, five days a week."

Project Head Start, brainchild of the Office of Economic Opportunity, represented the first federally funded program designed to "bridge the gap" between home and school. The early interventional and compensatory program was broadly conceived of as a seven-component multi-disciplinary enterprise including education, medical-dental care, nutrition, social services, parent education, and the involvement of community volunteers (Grotberg, 1969).

The multi-disciplinary approach appeared successful, for as the preliminary reports on the 1965 summer Head Start program reached Washington, there were indications that the United States government's first large scale venture into
early compensatory education had been an overwhelming success. The "Six Months Later" study (Wolff and Stein, 1965), found that after six months of kindergarten, Head Start children tended to be ranked high in their classes (first to third decile) in greater proportion than children who had not had Head Start. Further optimism was generated by Goldstein (1967) and Gray and Klaus (1965) who reported substantial gains as measured by the Stanford-Binet and/or WISC, among children in the program as compared with those of children in the control groups.

As follow-up studies were reported, however, it became apparent that the eight-week summer project had not significantly improved disadvantaged children's ability to cope with school over a period of time. Initial gains had disappeared by the end of second grade, with some Head Start children farther behind in school than their disadvantaged peers without Head Start. Weikart, Kamii, and Radin (1964) reported that the experimental and control groups diverged during the first year in the Ypsilanti study, and at the end of the year, group differences were impressive. This trend was reversed during the second year, and by the end of the year, group differences were no longer statistically significant. Analysis of the Westinghouse Learning Corporation data (1969), also indicated that Head Start programs had no effect upon either the child's cognitive or affective development.
Evaluation began to focus on the deficiencies of early interventional programs, specifically their inability to separate the child from his environment. According to Bernstein (1961), Hess and Shipman (1965), and Davis (1948), this was precisely the limiting feature of the program in that disadvantaged parents frequently made poor linguistic and motivational models for their children. In an attempt to alter parental modeling, educational and incentive-based work programs were added to many federally funded programs (Osborn, 1967). Altering parental attitudes and values through a work experience, it was hoped, would in turn influence the child's performance in an academic environment.

Several early compensatory programs relied heavily on parent involvement and participation, in an attempt to sustain the initial gains made by the children beyond the first two years of school. Although parent involvement had always been a component of the Head Start program, research at Texas University (Jacobs and Jones, 1969) suggested that involvement and participation alone did not necessarily alter parental attitudes or the children's academic proficiencies.

Training parents to be their children's teachers has, however, altered children's I.Q. scores as demonstrated by Karnes (1969) at the University of Illinois. Similar endeavors which use parents in the classroom and as home visitors, have fostered significant affective and cognitive
changes among the children involved in the programs (Gray and Klaus, 1968; Weikart and Lambie, 1967; and Gordon, 1970).

Disadvantaged parents are not the only segment of the population which is in need of help, for as Hunt (1969, p. 61) stated, "No social class and no cultural or ethnic group has exclusive rights to the domain of inadequate parentage; all conscientious parents must strive constantly for improvement on this score."

With increased awareness of "inadequate parentage" at all levels of the social structure, society may be willing to assume the responsibility for extensive educative programs geared to meet the needs of parents.

**Purpose of the Study**

The purpose of this study was to determine the degree to which parents could be taught to facilitate the cognitive development of their children in one area, the ability to conserve. A secondary purpose of the study was to identify and characterize those parents who adequately fulfilled the role of their child's teacher.
REVIEW OF LITERATURE

The Role of Environment from an Historical Perspective

Facilitating human cognitive development through a rich early experience is a relatively new concept. Prior to World War II, the early years were thought to be important only for the emotional development and personality growth of the child (Gesell, 1940).

Hebb's (1949) conclusion that experience was an essential mediator of neural connections and a requirement for the formation of cell assemblies prompted others to examine the role of experience. General acceptance of environment as a determinant of intelligence grew from Hunt's (1961) review of research. Bloom (1964), Deutsch (1960), Brunner (1965), Davis (1948), Dennis (1951), and Anastasi (1958) provided further support for the belief that learning is dependent upon early experience, and that "cumulative deficits" do result from disadvantaged environments.

Current research has focused upon the impact environment has on all learning which occurs prior to the time when a child begins school. Neonatal learning has been explored by Kaye (1969), Siqueland (1969), Brackbill (1969), Rheingold, Gerwitz, and Ross (1969).
Bandura (1967) has examined the function modeling plays in the development of the child's personality. Because of recent research, the role assigned to environment in the development of intellectual capacities has been greatly expanded.

**Early Experiential Programs**

Contradicting the then current educational philosophy, Maria Montessori developed in 1898 one of the first programs designed to reverse the effects of inadequate or inappropriate experience (Evans, 1971, p. 31). Working first with retarded children and later with street children in Rome, Montessori created didactic materials which are still used as learning devices with children today. Her influence on preschool education for the disadvantaged is just beginning again to be felt.

Margaret McMillan's (1919) work with London street children is another example of early compensatory education. Inviting children in off the streets and encouraging them to explore their new environment was basic to McMillan's philosophy. The British government did not provide funding to support the innovative work of McMillan. Thus, the idea of interventional education never grew beyond the neighborhood in which it originated.

A third example of early experiential programs is provided by Skeels and Dye's (1938) research with
institutionalized children. By placing supposedly retarded infants from an orphanage with young women in an institution for the retarded, the young retardates were able to provide sufficient stimulation so that the children began to show signs of normality. Follow-up studies (Skeels, 1965) found all of the institutionalized children leading routine lives after twenty years, while all of the children who remained in the orphanage were still receiving some form of public assistance.

**Current Interventional Emphasis**

Despite the work of Montessori, McMillan, and Skeels and Dye, early childhood education was slow to gain support in the United States. Except for the Works Progress Administration funding of nursery schools during the depression, and day care center funding during the Second World War, legislation was never enacted to deal with the education of the poor in a compensatory manner. Head Start represented the first federal funding provided expressly for the purpose of giving low-income children a "head start" on life. Head Start also provided the impetus for the development of other early educational models, and it gave support to those programs already in progress.

The influence of Bernstein's (1961) research on language modes, Hess and Shipman's (1965) study of socialization and conceptualization among disadvantaged groups.
Ausubel's (1964) documentation of the relationship between self-concept, social class, and school achievement, Piaget's (Evans, 1971, pp. 201-252) exploration of cognition, and Moore's work with the autotelic-responsive environment, is seen in today's innovative educational programs for young children. Demonstration projects based on a variety of psychological, sociological, physiological, and educational philosophies and theories have been established in the last decade throughout the United States.

Bereiter and Englemann's (1966) structured language approach arose from the belief that academic achievement was affected more by lack of verbal experience than by concrete experience. Heavy emphasis was placed upon repetition and teacher-directed learning. Gordon (1968) felt that deprivation in the early years resulted in restricted language, auditory, and visual discrimination. The Florida Model, developed by Gordon, accordingly stressed earlier intervention and exposure to a variety of stimuli with an emphasis on discrimination learning. Fearing an over-emphasis on cognition, Almy (1966) supported the traditional self-initiated play environment. The Ypsilanti Piaget-Based Curriculum for Early Education (Kamii, 1968) focused on the cognitive aspects of development as described by Piaget. The Montessori Nursery Schools continue to be concerned with the intrinsic motivation in learning, and the ability of the child to set his own pace. TEEM (Hughes, 1969) represented a
multi-disciplinary approach to learning with emphasis on many forms of language experience. DARCEE (Gray and Klaus, 1968) provided for learning both at school and at home by training parents in the use of reinforcement and instructional techniques. The New Nursery School (Meier, Nimnicht, and McAfee, 1968) in Greeley, Colorado, was influenced by Moore, Montessori, and Piaget. It is primarily an autotelic-responsive environment. The British Infant Schools (Blackie, 1967) represent a variety of philosophies, with the classroom teachers in charge of curriculum development and innovative involvement of the children.

**Parent Involvement Models**

Programs which have been most successful in maintaining initial gains have incorporated parent education as a primary component. As cited previously, involvement alone did not guarantee positive changes in parental attitudes and aspirations. Neither were results with parents immediate, as Heisler and Crowley (1969) demonstrated. Rather, parent education should be considered cumulative, and included as a long-range goal of compensatory education.

The Ypsilanti Project, directed by Norma Radin and Glorianne Wittes (1969) studied the most effective form of parent participation. They concluded that if a group was to have a long-term existence, it may be most productive to start with an actively-structured orientation which would
lend itself to maximum participation and to new learning in a restricted setting. Niedermeyer (1969) also found that a continual flow of information between the home and the school, and encouraging and assisting parents in home tutoring made a significant difference in the child's school performance.

Recent research indicates that mothers can be trained to be their children's teachers. In a study conducted by Karnes et al. (1968) at the University of Illinois, the following results were obtained: Children taught by professional teachers gained 14.3 Binet I.Q. points while children taught by their mothers experienced an average gain of 12.5 points. The difference of 1.8 I.Q. points between the two groups was not significant. Both groups used Karnes' structured preschool program in order to minimize the influence of curriculum deviations on learning.

Several studies examining the effectiveness of home visiting as an intervention strategy in compensatory education have been done at George Peabody College in Nashville, Tennessee. One study conducted by Barbrack and Horton (1970) analyzed the cost/benefit of three home visiting projects with the goals of each being the same. In each instance, an attempt was made to enhance the educability of the child by working with and through the mother in the home. The first treatment group was staffed by a professional teacher; the second group was visited by a paraprofessional
who had not had previous training; and the third group had home visitors who had been trained and supervised by home visitors from a previous study.

The results of the study indicated that home visiting tends to stem the relative decline or so called "progressive retardation" which characterizes the rate of academic aptitude development of many low-income children. The home visiting program resulted in significant changes in the mothers' manner of teaching their children. The Maternal Teaching Style Instrument data indicated that the mothers became more specific, more positive and less negative in teaching their children. No significant differences were found among the treatment groups. DARCEE personnel concluded that paraprofessionals could do the job as effectively as professionals for about half the cost. The average cost per child over a five-year period with paraprofessionals was less than $325.00 annually, more than $200.00 less than the cost of a professional.

DARCEE (Horton, 1969) also devised a program of instruction for mothers working in the classroom. The program included orientation, demonstration, classroom participation, and instructional classroom participation. At the end of seven months in the program, mothers had an average WAIS I.Q. gain of 6 points, in addition to playing an important role in the nursery school.
The Florida Model (Gordon, 1971) also made extensive use of home visitors and parent education. Parent educators visit the mothers in their homes once a week, teaching concrete skills and activities to use with the children. Each task is taught essentially through the demonstration approach. Parent educators stress the importance of language, and through the task material, provide examples of words which the parents could use in relating to their children. Children involved in the Florida Model have significantly outperformed their control counterparts on measures designed specifically for the program. Mothers have also been described as being more self-assertive, more self-confident, as well as experiencing gains in language and cognitive skills.

Several foreign nations recognized the need for early childhood education long before the United States considered it to be a national priority. Relevant to the discussion of parent and community education as it relates to young children's intellectual development are the observations made by Passantino (1971) of Swedish preschools. Passantino stated that (pp. 3 and 4):

1. Basic in the planning for Swedish early learning centers is the all-encompassing belief that education and social care are public rather than private concerns and as such require massive support by municipal and federal government.

2. Education for the very young is totally integrated into the social fabric of the community life—benefiting not only the children but also
their parents and older siblings and, at the same time, providing for each child's related medical and physiological needs.

3. The starting age for structured learning is much lower in Sweden, often as low as six months and reaching to age seven when compulsory education generally begins.

4. Swedish school design must be viewed within the larger concept of town planning—physical plans for building, site, and community are integrally related.

Of special interest is the social commitment, community involvement, and heterogeneity of grouping which is basic to Swedish preschool programs, with most centers open for the convenience of working parents. Classes to demonstrate child-adult interaction techniques are scheduled so that fathers, as well as mothers, are able to attend.

Parent education, community involvement, and home visiting appear to have been an integral part of successful preschool programs in the past. Research has indicated that human potential is highly modifiable, and that the cost of compensatory programs can be minimal. A lack of commitment to educate families in both the cognitive and affective domain on a national basis now appears to be the major hindrance to positive change.
METHODOLOGY

Selection of Subjects:

Twenty-six preschool age children living in Tucson, Arizona during the spring of 1972, as well as the parents of thirteen of the children, served as subjects for this study. The experimental group parents were selected on the basis of their willingness to participate in an educational training program. Control group parents did not attend the training session, and as such, were included only because their children served as a matched group for the experimental group children.

The children were matched on the basis of sex, race, socio-economic status of the family, preschool experience, and chronological age. In order to qualify for the sample, the parents of the experimental group children had to attend at least one parent training session. Twenty-one children were pretested for inclusion in the experimental group, but eight were excluded because their parents did not meet the attendance prerequisite.

Collection of Data

Recording Form A of the Goldschmid-Bentler Concept Assessment Kit: Conservation (Goldschmid and Bentler, 1968),
was administered to the children during the day at either The University of Arizona Nursery School or the Escuela Montessori Nursery. The investigator pretested all of the children in the study during the last week in April.

The six-part test of conservation had a total possible score of 12; one point was given for each correct verbalization, and one point was given for each correct response explanation. Subtests measured the child's ability to conserve in terms of number, weight, substance, two-dimensional space, continuous quantity, and discontinuous quantity.

The instrument was selected because none of the experimental group parents were familiar with Piaget's principles of conservation. Intentional transfer of the concepts involved in conservation without parent-training was thus unlikely.

Three weekly training sessions for the experimental group parents were held at The University of Arizona Nursery School during May. At each of the evening sessions, the principles of conservation were discussed and demonstrated. One of the children in the experimental group was used to illustrate the typical nonconserving responses exhibited by a four-year-old. Reinforcement techniques and the process of modeling correct responses were also explained. The parents were given a game kit and guideline for use with their children the following week. They were asked to record the
amount of time spent on each game and the child's reaction to it (Appendixes A, B, and C). The record sheets were collected at the beginning of the second and third session, and during the home visits. Reaction sheets provided an opportunity for parents, as well as the investigator, to determine actual parent-child interaction and its consequences.

Post-tests were administered to the twenty-six children in this study during the home visits with the families in June. Recording Form B (Goldschmid and Bentler, 1968), a parallel form of the pretest, was used for the post-test. The six-part test administered to the children at the conclusion of the study was similar to Form A, except that the tasks were slightly different in Form B. The variance between the two test forms eliminated the possibility of uniform response sets from one testing situation to the next.

**Test Reliability and Validity**

Conservation is related to performance on all school subjects. Significant correlations are usually found between conservation, arithmetic grades, social studies, and all subjects combined. In a sample of 102 first and second graders, the correlation between conservation on the one hand, and mental age, I.Q., and WISC vocabulary on the other, were .49, .31, and .40 respectively (Goldschmid and Bentler, 1968).

Goldschmid (1968) investigated the relationship of conservation to affective and environmental factors in the
child's development. The results indicated that the children with a high level of conservation tend to be (1) more objective in their self-evaluation, (2) described more favorably by their teachers, (3) preferred by their peers, (4) less dominated by their mothers, and (5) seen as more attractive and passive than children with a low level of conservation. Significant results were obtained with children as young as 3½ years of age.

When the test was readministered to a second group of children with background similar to the first group's, internal consistency reliabilities for the same four tests were .96, .97, .95, and .95 respectively. All three scales were found to be both highly homogenous and demonstrated high internal consistency.

**Treatment of Data**

The small sample size made statistical analysis of the data superfluous. Rather, the data were presented in terms of arithmetic summations, percentages, means, and visual presentations. On the basis of the investigator's observations, congruence between parental behavior and the children's pre- and post-test scores was discussed.
RESULTS AND DISCUSSION

Description of the Children and Their Families

Twenty-six children with a mean age of 5.05 years were included in this study. The age range of the subjects was 4.2 years to 5.7 years. The majority of the children included in the study were male, boys represented 53.8% and girls comprised 46.2% of the total. Twenty-four of the children had siblings living in the home with them; one had an older step-sister who was married and living away from home; and the twenty-sixth was an only child. One set of twins and one brother-sister combination were included in the experimental group, making a total of eleven families who participated in parent-training. Twenty-four families were represented in the study.

Twenty-four of the children in the study had been involved in some type of preschool program. Six of the children in the experimental group and their six control counterparts were enrolled in The University of Arizona Nursery School; two experimental children and two control children were attending a Montessori nursery; eight of the children were enrolled in a variety of programs; and two had not participated in any type of preschool program.
Parental education and occupation were similar for the experimental and control groups. Three of the mothers whose children were in the experimental group had advanced degrees; four had received, or were about to complete requirements for an undergraduate degree. The remaining four had completed high school. Two of the mothers whose children served as controls had advanced degrees; five had college degrees; and six were high school graduates.

On the basis of employment, three of the fathers in the experimental group and four of the fathers in the control group were classified as professional; two of the fathers in the experimental group and three of the fathers in the control group were classified as semi-professional or managerial; two of the fathers in each of the groups were graduate students; two of the fathers in the experimental and four of the fathers in the control were classified as skilled; while one father in the experimental group and none in the control group was classified as semi-skilled. One experimental group child's father was deceased.

**Parent Involvement**

Reasons given by parents for becoming involved in this study were varied. The majority of parents expressed a concern for the intellectual development of their child (children). One father remarked that he was "...really glad to learn some stuff that would help his kids." Several
mothers expressed interest in how conservation was related to school success. One mother asked specifically, "If I play these games with E10, will I be able to make her more intelligent?" Two mothers were confused about the purpose of the parent training sessions; one mother thought that she would be learning how to "...control her kids," while the second sympathized with the investigator and wanted her to "...have lots of people at the meetings."

Parental attendance at the three weekly training sessions was 100% the first evening, 82% the second evening, and 73% the third evening. Previous commitments, such as organizing a fast to protest the war, attending a political meeting, and studying for a final exam prevented three of the parents from attending all of the sessions.

Paternal attendance was sparse. Four men accompanied their wives to the first session. Only one of the original four attended the second and third session. When asked, the women reported that their husbands "...didn't think they'd have time to play the games and probably wouldn't be very good at it anyway." Apparently, playing with children was still considered by families in this study to be part of the mother's domain.

Involvement also included the actual amount of time parents spent in planned interaction with their children each week. On the basis of parents' estimates, the mean amount of time spent in playing the assigned games, or innovations
on them, was 17 minutes per week, with the range being 0 to 38 minutes. One mother did not play any of the games with her daughter (E7), and one boy (E1) refused to play any of the games with his parents during the three-week period. A third mother reported that she had started with the water play but that it "...got too messy." She did not try any of the other activities.

Reporting of activities was extremely diversified. One mother produced two-page typed reports on her child each week; three wrote short comments and described other activities they had been involved with during the week; and two failed to produce any kind of record. This was understandable, however, in that these same mothers were the ones who had not played the games with their children. The remaining five mothers returned the record sheets each week with only the information requested.

The use of new ideas in relating the concept of conservation to the children also varied from family to family. Several parents were innovative in their use of the kits and weekly guidelines, while other parents, as discussed previously, were unable to complete the basic assignments. Variations included the relational use of body parts; for example, feet belonging to the same person are the same size when placed side-by-side, but does one become larger if it is moved ahead of the other; object segmentation in comparison to the whole; for instance, is an orange which has been
quartered equal to a whole orange; and grouping on the basis of attributes other than size, shape, and color, such as how are an airplane, bird and kite alike.

According to parental reports, popularity of assigned games was not stable. The children were most eager to participate in water play. All of the reporting families stated that it was one of the activities requested most often by the child. The least popular games were those involving routine household tasks, specifically, table setting and food service. Mothers seemed to be hesitant in allowing their children to help around the home. Generally, four- and five-year-old children were not considered responsible enough to assist with minor household tasks. Although only three of the mothers used the balloon game with their children, all reported that it was very successful. Incomplete instructions prevented the others from trying the activity. Table 1 summarized the total number of times an activity was reported. Each child may have engaged in an activity more than once during the week, thus several of the totals exceed the number of children in the experimental group.

Test Results and Response Patterns

The experimental and control group children were similar in their pretest scores. Five of the experimental group children seemed to have a partial understanding of the
Table 1. Total Reported Parent-Child Interactions

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<th>Activity</th>
<th>Total Reported Interactions</th>
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<td>Matching</td>
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<tr>
<td>Water Play</td>
<td>19</td>
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<tr>
<td>Food Service</td>
<td>4</td>
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<td>Block Building</td>
<td>17</td>
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<tr>
<td>Table Setting</td>
<td>9</td>
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<tr>
<td>Balloons</td>
<td>8</td>
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<tr>
<td>Relational</td>
<td>13</td>
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<tr>
<td>Feely Bag</td>
<td>16</td>
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<tr>
<td>Play Dough</td>
<td>11</td>
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<tr>
<td>Nuts and Bolts</td>
<td>7</td>
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<tr>
<td>Other</td>
<td>9</td>
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principles of conservation. Three of the children in the control group answered some of the questions correctly, and were able to explain their responses adequately. Eight of the experimental children and ten control children were unable to answer any of the questions correctly. Of a total of 156 possible correct responses and explanations, experimental group children gave 14 correct answers, while the control group children answered 17 correctly.

Table 2 represents the children's pre- and post-test scores on the Goldschmid-Bentler Concept Assessment Kit: Conservation, as well as parental attendance at the three weekly training sessions. It was noted that eight children in the experimental group improved markedly in their ability to conserve following parent training. One child improved slightly; two children's scores worsened; and two children scored zero on both the pre- and post-test. In terms of percentages, 69.2% of the children in the experimental group improved their scores on the post-test, while 30.8% remained at or fell below the pretest level. A total of 86 correct responses were given by experimental group children at the conclusion of study. Control group children gave a total of 27 correct responses out of a possible 156 on the post-test.

Three children in the control group improved their scores on the post-test without parental intervention. They were the same children who understood the concept on the pretest, and they apparently were able to transfer their
Table 2. Conservation Behavior of Twenty-six Preschool Children Preceding the Follow-Up Parent Training and Weekly Parental Attendance

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<th>Code #</th>
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<th>Weekly Parental Attendance</th>
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Totals: 14 86
Table 2, Continued.

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knowledge to the new tasks on the post-test. This was consistent with what other researchers have found relating to the influence of experience and maturation on the transfer of learning (Goldschmid, 1968; Murray, 1972).

A complete understanding of conservation appeared to have been a spontaneous occurrence for several of the children in the study. Peer teaching of the concept was also evident. Three of the mothers whose children scored zero on the pretest and had a perfect score of 12 on the post-test said that their children experienced a sudden understanding of conservation during the first week of the study. As one put it, "A crafty gleam came into her eyes." Another described it as the "Eureka effect."

Identical twin boys (E12 and E13) were included in the study's experimental group. They were atypical twins, however, in that they neither acted nor dressed alike. The discovery that they were twins was made when the investigator was checking birthdates and realized that they had been born on the same day in August. When asked if he were a twin, E12 replied, "Yeah, but my dad says I don't hafta be." In other words, the parents had stressed individuality. Consequently, when the mother suggested that they play the first week's games, E12 agreed while E13 declined. Both had scored zero on the pretest, but on the post-test, the one who had played the games (E12) scored 8 while the dissenting twin (E13) answered only two of the questions correctly. Their
mother suggested that E13 had picked up an incomplete understanding of the concept through his brother who had convinced him to play one of the games without parental encouragement.

Although peer teaching has received little attention at the preschool level, several of the parents with younger children reported a phenomenon similar to the one described above. Children involved in the study were overheard asking a younger sibling, "Now, does this have more or are they the same?" The three-year-old sister of E6 was tested because the mother was curious as to how effective her five-year-old had been in relaying the concept of conservation to her younger sibling. The child was able to give correct responses to the six test items, but was unable to explain any of her verbal behavior. The mother assured the investigator that she had not worked with the child, and that she had played the assigned games with the five-year-old while the others napped. It would appear from the limited number of children in this study that conservation was quite easily taught through peer group interaction. Further research which examines the teaching abilities of preschool children in other areas of cognition is needed.

Modeling of correct behavior also appeared to have been an integral part of the children's learning, as indicated by their interactions with siblings and parents during the study. When E10 was unable to enlist the cooperation of
her younger sister, she announced that she was "...just gonna have to work with dad." She then insisted that he play the same games her mother had played with her, giving explanations similar to the ones employed previously by her mother. Although the wording was not exact, her parents said that it was obvious that she had adopted an adult response pattern. Along with peer teaching, behavior modeling as it relates to preschool-age children is an area which deserves further exploration.

An auxiliary finding which impressed the investigator was the response pattern of the children. Three methods of correctly explaining a response were available to the children; invariant quantity, compensation, and reversibility (See Appendix D). No credit was given for magical explanations, such as, "My teacher made it happen"; perceptual explanations, for instance, "It looks the same"; or a description of part of the procedure, for example, "You moved them apart." Invariant quantity, reversibility, and compensation were explained and demonstrated at each of the parent training sessions. Surprisingly, the majority (5) of the children in the experimental group who made large gains employed a uniform response system; that is, they explained all of their behavior on the basis of only one of the principles of conservation, reversibility, compensation, or invariant quantity. The investigator was led to believe that in explaining the principles of conservation to the parents,
most of them internalized one for use with their children and related the concept in appropriate term. The remaining three children who made large gains, however, based their explanations on a combination of the three principles. Therefore, no statement can be made on the basis of this study concerning parental adoption of specific teaching techniques. It would seem safe to assume that given a choice, many parents incorporate only those concepts which are meaningful to them at the moment.

**Parent-Child Interactions**

The ways in which the parents in this study related to their children varied from family to family. Home visits to post-test the children provided insight into the unique environments in which the children were reared. Few universal familial characteristics were found. Parents were dissimilar in the emphasis they placed upon achievement, success, and individuality. A variety of value systems were also evident.

Most of the children in the study had healthy self-concepts. They were aware that they were respected and valued by parents. The majority seemed to feel at ease in the test situation, exhibiting the kind of confidence which, in the investigator's opinion, grew out of previously positive adult-child interactions. E9 exemplifi i the influence admiring parents had on a child's feeling of competence i.
novel situations. Answering only two questions correctly on the pretest, E1 was nevertheless confident that he was doing well. It was obvious that he had been successful in other intellectual endeavors as he announced periodically, "I'm doing pretty good, aren't I?" The child had a perfect score of 12 on the post-test. Prior to the test when he was asked to play some games, the investigator was told that he was not at the nursery to play games, but to have his intelligence tested. The kinds of feeling parents gave their children about themselves was especially evident in the testing situation. Children expressing adequacy had parents who seemed to appreciate the unique nature of their child (children).

Two of the mothers in the experimental group, however, openly discussed the child's supposed limitations in his (her) presence. "He just doesn't seem to have it" was the comment made by E1's mother. The conversation continued with her extolling the intellectual virtues of an older daughter. Comparisons of the two appeared to have been a frequent occurrence. The other children who were described as being "dumb" (E4 and E5) were part of an eight-member family. The mother complained that "...out of six kids, you'd expect one to be smart." She did not believe that her children were above average in any area. Of the three children who were described by their mothers as being subnormal, two had lowered scores following parent training, while the
third remained at his original score of zero. The home environments of the children described above appeared to have been less conducive to learning than the nursery school they had attended during the academic year. One could conclude that in the daily presence of their parents, the children had actually regressed in their understanding of conservation during the two months which elapsed between pre- and post-testing. It seemed that the children had actually begun to play the intellectual roles assigned to them by poorly informed and unthinking parents.

Respect for the individuality of each child manifested itself in a number of ways also. The twins' parents obviously respected their need to be different, as did the mother of C1. She showed an unusual concern for her child's desires when she asked him if he were willing to serve as a subject before she committed his time. It was noted that the child whose wishes had been considered by his mother, performed remarkably well on both the pre- and post-test. Although other factors may have accounted for the performance, parental respect for the child's rights may have been basic to his early intellectual development.

Adult self-worth appeared to have been measured in part by the child's ability to conserve. Seven of the parents who were involved in the training expressed an interest in learning how successful they had been in teaching their child conservation. It was the investigator's impression
that many of the parents viewed the child's acquisition of the concept in terms of parental self-worth.

Extremes in values were also expressed by the families involved in the study. Two of the children were not available at the scheduled time for post-testing because their mother had sent them to a musical production with their four siblings and several neighborhood children. The mother apologized and explained that she had really wanted them to see it, stating that she had been forced to "...write a bummer (check) to get them there." An opposing sense of morality was apparent when the investigator met with a mother and her daughters in the park for post-testing. One of the girls found gum under the table. The mother informed her that putting gum under the tables was a very dirty habit and that "...only dirty people do that." She then asked the child if she would ever do anything like that. The child assured her that she would not. Both parents were teaching values; one inadvertently, one purposively. The ethical environments of the two families were likely to yield dissimilar products.
SUMMARY AND CONCLUSIONS

It was the purpose of this study to determine whether or not parents could be taught to facilitate the cognitive development of their children in one area, the ability to conserve. A secondary purpose of the study was to identify and characterize the parents whose children correctly answered more questions on the post-test than on the pretest.

Recording Forms A and B of the Goldschmid-Bentler Concept Assessment Kit: Conservation, were used to gather the data. In addition, a parental report form was used to measure the amount of time spent in planned parent-child interactions.

The study was designed originally to include thirty children from the Davis-Monthan Air Force Base Nursery, but because only one\(^1\) out of over eighty parents contacted

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1. An employee of the Base Nursery informed the investigator that parents did not send their children to the Base Nursery if they could afford another type of program for their children. A disproportionate number of enlisted men's children, in comparison to non-commissioned and commissioned officers' children, were enrolled in the Base Nursery. Because take-home pay was low, the enlistees may have compensated by taking advantage of the Air Force's "fringe benefits." Apparently when funds were limited, a child's preschool experience did not head the enlisted men's set of priorities.
agreed to participate in the training, another sample had to be drawn from The University of Arizona Nursery School and the Escuela Montessori Nursery.

The children whose parents participated in the three weekly training sessions made large gains in their ability to conserve in nine out of thirteen cases. The remaining four children in the experimental group remained at or regressed from their pretest scores, indicating that this method of parent education at the cognitive level is not effective for all adults.

A characterization of the ideal parent-educator on the basis of the limited sample included in this study must be tentative, at best. The parents whose children made marked improvements on their ability to conserve shared several characteristics worthy of elaboration.

It would appear that maternal education influences the child's cognitive development in the limited area measured. All of the children who did well on the post-test had mothers who had received a degree, or were completing requirements for a college degree.

Parents who appreciated the unique qualities of their children, and respected their individuality, also had children who scored high in their ability to conserve at the conclusion of the study.

A third shared characteristic of the parents whose children performed well on the post-test was a basically
warm, secure relationship with the child proceeding the study. Contempt for the child seemed to create hostility, and a refusal on the part of the child to perform the required tasks.

A fourth characteristic was patience. Those parents whose children did well were able to endure the messes indigenous to several of the prescribed games. Children whose parents were unable to tolerate disorder scored poorly on the post-test.

Fulfilling the parental role with enthusiasm and flexibility also characterized those parents whose children made gains following parent training. An attitude towards parenthood was negatively associated with the child's test scores.

The finding of this study suggest that, for the most part, parents, with a minimal amount of training, can influence their children's cognitive development positively. Parents who did not benefit from the three-week educational program appeared to have more basic deficits. An improved understanding of interpersonal relationships and techniques of working with children may have been more appropriate for those parents.

Some of the limitations of the study were as follows:

1. The small sample size made generalizing to a larger population impossible.
2. The entrance behavior of the adults in the experimental group was not systematically assessed in terms of their expectations for parent education or the fulfillment of those expectations.

3. The select group of volunteers who made up the sample exhibited an unusual concern for the intellectual development of their children. Such parents may be atypical of population.

4. Post-testing was done in the children's homes, creating a different testing situation for each child.

In order to verify findings and provide additional information, the investigator proposes the following suggestions for further research:

1. Replicate the study using three groups; one to serve as a control; one to receive written instructions only; while the third group would receive training and be required to record planned parent-child interaction. In this manner, the role of the instructor could more adequately be assessed.

2. A study comprised of low-income families only would provide insight into the most effective method of grouping parents for maximum participation and benefit.

3. When measures of affective, in addition to cognitive, growth become available it may be beneficial to develop programs for parents which place emphasis on the interpersonal relationships encountered in family and
community life, such as sharing, cooperation, and respect for individuality.

Additional research in the suggested areas would document the most effective method of teaching parents, and the most efficient grouping of parents for maximum participation. Research in the affective domain may create an understanding of how parents shape future societies through interpersonal relationships with their children.
APPENDIX A

PARENT GUIDELINE--1

1. Color, size, and shape matching: Ask your child to group the paper cut-out by color. When the task has been completed, ask: "How are they the same?" If a correct response is given, say: "Yes, that’s right, they are all the same color (yellow, red, or green)." Repeat the shape and size matching game on different days, using the same procedure. Tell the child when he has grouped the cut-out successfully.

2. Water Play: While your child is bathing or helping with the dishes, provide several containers of different shape and size so that the child can experiment with volume relationships. Measure a cup of water and pour it onto a short, fat can. Pour another cup into a tall glass. Explain that as water takes different shapes, there is still the same amount as there was when you began. Repeat with many different shapes and sizes of containers but hold the volume of water used constant.

3. Food Service: Place an equal serving of vegetables into two identical bowls. Ask the child to spoon the vegetables from one bowl into individual dishes. Ask the
child if there is the same amount of vegetables in the serving dish as there is in all of the individual dishes together. This can be repeated with instant coffee, measuring for one large pot as compared to several cups.

4. Block Building: Ask your child to count out an equal number of blocks for both of you. Encourage your child to build something with the blocks. When your child's design is finished, build something which does not resemble his creation and ask: "Are there as many blocks in your design as in mine, or does one have more?" If your child says that they are not the same, count each pile of blocks and ask the question again. Identical designs can also be built to show that you both have the same number of blocks.

Please check the activities you are involved in with your child each day. Do not spend more than 10 minutes on any one activity during the day. If you become involved in related activities, please describe and give an estimation of time spent with the activity. Circle the game your child seemed to enjoy most and bring the report form on the bottom of this sheet with you next Wednesday evening.

--------------------------------------------

Matching
Water Play
Food Service
Block Building

--------------------------------------------
1. Table Setting: Ask your child to count the number of spoons needed for the family meal. For example, if there are five family members, five spoons will be needed for the meal. Count an equal number of spoons for the second pile, and place the two piles next to each other. Ask your child if there are the same number of spoons in each pile. If he says yes, ask him to set the table with one stack of spoons, while the other stack remains on the counter. When the task is completed, ask your child: "Are there the same number of spoons on the counter as on the table, or does one have more?" If your child says they are the same number, you may vary the task with stacks of plates, other flatware, or glasses. Restacking the tableware and recounting the objects may help your child understand that only the appearance changes when articles are spread out, not the actual number involved.

2. Balloons: Blow equal amounts of air into two balloons which are the same size, shape, and color. Ask your child if there is the same amount of air in each. If the answer is no, adjust the two until the child says they are
the same. Transfer the air from one into another balloon which is a different shape, but the same color. Ask your child again: "Is there the same amount of air in this balloon as in this balloon, or does one have more?" If the answer is no, transfer the air back to the original balloon and explain that even though the air took a different shape, there was the same amount of it in both balloons. Different colored balloons can be used when your child understands the first half of the task.

3. Relational Concepts: Licorice can be broken into different lengths for this game. Place three lengths of licorice parallel to one another. Ask your child to select the shortest, the longest and the middle-sized piece. The concept of short, shorter, and shortest as well as long, longer, and longest can also be discussed. When you feel that your child understands the terms, break a licorice into two equal lengths. Place the two pieces parallel to one another and ask: "Is this piece of licorice the same length as this one, or is one longer?" Adjust the two until your child says they are the same length. Then move one to the right slightly and ask the question again. Compensation, invariant quantity, or reversibility can be used to help your child understand that the length of the two has not changed, only the relative position of each.

Please check the activities you are involved in with your child each day. Do not spend more than 10 minutes on
any one activity during the day. If you become involved in related activities, please describe and given an estimation of time spent with the activity. Circle the game your child seemed to enjoy most and bring the report form on the bottom of this sheet with you next Wednesday evening.

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APPENDIX C

PARENT GUIDELINE—3

1. Feely Bag: Ask your child to find two sets of identical, unbreakable objects which could be used in the feely bag. Place each set in identical bags and blindfold your child. Ask your child to place the right hand in one bag and the left one in the other bag. By feeling, identical objects are identified and removed from the bags. Variations would be the use of different containers, objects which are similar and serve the same purpose (such as two plastic cups which are alike, but not identical), or all objects placed in the same container, the purpose being to again identify sets.

2. Play Dough: Divide the dough into two equal pieces, one for you and one for your child. Make sure that your child understands that the two pieces are equal in weight. Both you and your child can make anything with the dough. When the creations are finished, ask your child if his weighs the same as yours, and if so, why. An understanding of the principles of compensation, invariant quantity, and reversibility should be part of your child's explanation.
3. Nuts and Bolts: The child is allowed to do anything with your supply of nuts, bolts, and washers. After becoming acquainted with them, ask the child to separate them into two equal piles, one for himself and one for you. Different combinations of nuts and bolts can be assembled, but if you each have the same number, each conglomeration should weigh the same amount. Ask your child if this is the case. If a correct response is given, ask for an explanation.

Please check the activities you are involved with during the week with your child. Do not spend more than 10 minutes on any one activity during the day. If you become involved in related activities, please describe and give an estimation of time spent in the activity. Circle the game your child seemed to enjoy most. Please keep this record sheet until our home visit in June. Thank you for your cooperation.

---------------------------

Feely Bag

Play Dough

Nuts and Bolts

Other
APPENDIX D

DEFINITION OF TERMS

1. Compensation: Compensation, according to Goldschmid and Bentler (1968), is one of the three correct explanations of conservation used by children. For example, a child employing the principle of compensation, when confronted with equal amounts of water in two containers shaped differently, would say that "...this glass is taller, but it is also thinner." The child compensates for the apparent differences by logically allowing for the relative amount of space occupied by equal quantities of a substance shaped dissimilarly.

2. Conservation: According to Honstead (1968), conservation is an essential part of Piaget's theory of intellectual development. To be able to conserve means that the child can see that certain properties of an object stay the same when the appearance of the object is changed; for example, an apple resting on the table will still be an apple when placed on a chair (spatial displacement), or a round ball weighing 50 grams will still weigh 50 grams when rolled into the shape of a sausage (conservation of weight). According to Piaget, the gradual discovery aids the child in
understanding the constant properties of objects. Classification of these objects thus becomes much easier.

3. Concept Assessment Kit: The Conservation Concept Assessment Kit consists of three scales. Forms A and B are parallel forms. Form C measures area and length. On each scale the child's level of conservation is determined by his conservation behavior, and his comprehension of the principle involved. Conservation behavior refers to the child's judgment of the relative quantity of two objects, one of which has just been manipulated by the examiner. Comprehension is assessed by the child's explanation for his judgment.

4. Invariant Quantity: Invariant quantity is the second acceptable explanation for conservation behavior described by Goldschmid and Bentler (1968). It refers to the fact that unless something is added or subtracted from a given quantity, the amount does not change even though the appearance may be altered.

5. Reversibility: Goldschmid and Bentler (1968) describe the third acceptable explanation for conservation behavior as reversibility; the ability to reverse the manipulative process in order to determine that a quantity has not changed in spite of its appearance.
LIST OF REFERENCES


Ausubel, David P. How reversible are the cognitive and motivational effects of cultural deprivation? Urban Education, Summer 1964, 16-37.


Murray, Frank B. Acquisition of conservation through social interaction. Developmental Psychology, 1972, 6, 1, 1-6.


Radin, Norma, and Wittes, Glorianne. Two approaches to group work with parents in a compensatory preschool program. ERIC ED 035056, 1969.


