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ABSTRACT

Reviewed on a layman's level was research on psychopharmacology with the emotionally and behaviorally disturbed. General conclusions drawn from the many studies were that the effect of drugs on intellectual functioning had not been determined and that there was little evidence to indicate that the learning process was consistently and reliably affected in certain predictable ways. It was advised that the psychologist be informed when a subject was receiving drug medication, the drug name, and dosage. The review concerned stimulants, tranquilizers, and sedatives frequently used by pediatricians. Stimulants referred to in research included dextroamphetamine, D-amphetamine, methylphenidate, monoaminoxidase inhibitors, amitriptyline, proamitriptyline, and cholinergics; methylphenidate was the drug used most often. Tranquilizers cited were thioridazine, chlorpromazine, reserpine, phenothiazines, diphenylmethanes, fluphenazine hydrochloride, chlorprothixene hydrochloride, primazine hydrochloride, and thiorpropazate; drugs were found to be an advisable treatment for behaviorally disordered children. Sedatives covered included diphenylhydantoin sodium and captodiamine hydrochloride. (CB)

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PSYCHOPHARMACOLOGY WITH THE BEHAVIORALLY DISTURBED: A REVIEW

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## INTRODUCTION

Treatment for behaviorally disordered children can be separated into three general categories: psychotherapy, milieu or environmental therapy, and chemotherapy. It is this latter group that is explored in this paper.

The paper originated from the writers' interest over the increasing number of children found in both the public schools and institutions who were receiving or had recently been receiving some kind of internal medication of a drug form. Many reasons could be offered to account for this state of affairs. Several of the more important ones include:

1. Overabundance of complimentary samples supplied to physicians by pharmaceutical houses make prescription of same a very convenient choice.

2. Shortages of mental health workers, adequate programs, and child specialists have created "time" premiums and priorities. In short, when case loads become excessively large, and the demand for long or short term therapy, although needed, cannot be provided, chemotherapy is sometimes used as a "better than nothing" technique. Frequently, too, prescribers of drugs are not fully cognizant of the emotional referents underlying a problem. What occurs is treatment of the major physical

symptom(s), at the expense of neglecting the true emotional pathology underlying the symptom(s).

3. Psychological predispositions and dependencies existing in our culture that aim for instantaneous and impulsive cures. Where traditional therapies may require a large number of sessions before progress becomes overtly visible, in addition to the well known phenomena of a patient characteristically becoming worse before getting better, the use of drugs, in contradistinction, typically creates an immediate diminution of symptoms. This occurrence becomes a reinforcer for teachers, parents, and the doctor such that when success in drug therapy is found for one student or child there are often heard clamors for its dissemination to other students and children, frequently irrespective of different behavior problems. The press, as reflected by recent articles in popular news periodicals, and the television media to a lesser extent have, in many instances, popularized to their respective audiences the "miracle results" of certain drugs in remediating behavior problems. Likewise, a psychological set to take medication when "sick" is part and parcel of American tradition.

These factors are not meant in any way to be an exhaustive or mutually exclusive list, but rather serve as a starting point for highlighting the need for child specialists to add

to their professional armamentarium of skills. Nor are the writers questioning the legitimacy of such prescriptions after careful study of the problem, other alternatives, and in consultation with a professional team. Rather, emphasis is placed on suggesting that if drug therapy continues to increase in popularity as the treatment of choice, then definite implications emerge for the role and function of the psychologist. In short, he will need to be minimally conversant in the basic terminology of psychopharmacology, and to some degree be able to assess the anticipated effects, purposes, advantages and disadvantages of a particular drug in relation to the learning process. This dissemination of factual information and consultation may occur with a physician, a teacher, and/or parent. As a member of a psychological services team he may on occasion even initiate referrals for possible drug therapy, or suggest other, more efficient alternatives in its place.

Review of the available research did produce a number of sources that described the drugs and their observed effects that are in present use for treating disturbed and socially disordered youngsters. Although far short of a comprehensive review of chemotherapeutic agents for psychiatric disorders, a number of studies are reported that deal with many of the drugs that are in regular pediatric usage and that have been encountered frequently by the writers.

This review is organized in the three general drug classes: stimulants, tranquilizers, and sedatives. It appears that this arrangement give greatest consideration to presenting studies in an order that allows some comparison of their respective behavioral effects. The drugs have been referred to by their generic or chemical names in this treatment. To facilitate brand name associations and to encourage continued reference to this work, a table is included that lists the generic name alphabetically according to general drug groups. This name is followed by the better known brand or trade name of the drug. All efforts have been made to reduce the technical aspects of this scientific field to a minimum so that drug therapy can be understood on a fairly basic level. For this reason little mention is made of physiological or anatomical effects. Certainly the behavioral elements give us enough concern to warrant centering this investigation there.

## STIMULANTS

It has been known for some years that stimulant drugs, such as dextroamphetamine, may have a beneficial effect on school performance of hyperkinetic or emotionally disturbed children (Bradley, 1937). Children treated with these stimulants rarely become excited, but rather tend to become more calm, purposeful, and organized in their behavior. In some children the alteration in behavior has been described as truly remarkable. Side effects -- other than mild anorexia and insomnia -- are rare, and these tend to diminish in most children, even with high dosage of the medication (Bradley, 1951; Bradley, 1958).

A recent study appears to lend strong support to claims that this drug action has its main behavioral effect on increasing drive level and response vigor in children. Fifty-eight children from a public school system, who had been selected by teachers as having serious learning problems, were randomly assigned to two groups. One group received a daily treatment of dextroamphetamine, the other a matched placebo for one month. At the end of this time, the treatments were switched. All treatments were double-blind. Measures of intellectual performance and assertiveness were obtained by objective, factor analyzed test measures. Teachers also rated

the children before and after each treatment. The results indicated that improved school performance and classroom behavior was substantial, but the objective test changes were questionable (Connors et.al., 1967).

Solomons (1965) has discussed some additional changes produced by dextroamphetamine therapy and cites loss of appetite, restlessness and interference with sleep activity, pale and sallow facial appearances, and nervousness after certain kinds of activities.

Zrull et.al., (1963) compared D-Amphetamine with other drugs. Sixteen children ages 7 to 14 of overall average intelligence received three medications in a double-blind, cross-over pattern for an eight-week period. A battery of tests, ratings by parents and teachers and medical people, and laboratory findings of physical changes were analyzed. Considerable improvements in all children were noted and continued to sustain in some children. The D-Amphetamine was judged more effective than chlordiazepoxide in the reduction of manifestations of the hyperkinetic syndrome. Both drugs appeared to be significantly more effective than the placebo.

Amphetamines have also been successfully used at times in modifying hyperactive behavior. They have been in use for many years (since approximately 1930) in the treatment of brain damage behavior symptoms (Bradley, 1958; Denhoff, 1961;

Laufer, et.al., 1937). This stimulant or activator drug has a similar paradoxical effect in seeming to calm and organize behavior in some children by reducing fluctuations in vigilance and alertness and increasing attention span (Bradley, 1951; Paine, 1962).

Other investigators have found amphetamines especially helpful in cases of dyslexia where there is a short attention span or distractibility but no hyperactivity (Clements and Peters, 1962). Teachers reported that the child "seemed more interested in his work," or "at least had begun to show some progress in reading." The drug was administered at breakfast and at lunch and two forms of amphetamine sulfate were used. These authors maintain that racemic amphetamine sulfate acted differently from dextroamphetamine and was superior in its effect on some children.

A study by Laufer et.al. (1937) produced a significant improvement in the "hyperkinetically impulse disordered child" when treated with amphetamines and followed over a three-year period. In this study, attention span, hyperactivity, and behavioral ratings by teachers and neighbors could be manipulated in a positive way by increasing and decreasing dosages. Other investigators do not confirm these findings although it should be noted that they used only 20 mg. per day as a total dosage compared to Laufer's use of up to 40 mg. per day (Bender & Nightern, 1956, Fish, 1960, Freedman, 1958).

It has been suggested that the amphetamines act to alter organic or maturational impairments of brain functioning, but this hypothesis has not been supported by EEG changes accompanying behavioral improvements following drug administration (Lindsley & Henry, 1942).

Clement et.al. (1970) in a recent article articulated many of the abuses of amphetamine and amphetamine-like drugs. It was noted that these drugs possess a wide variety of undesirable side effects even at recommended dosage levels. Specifically, the authors stated:

Instead of alertness, or wakefulness, the patient may complain of nervousness, insomnia, headache, irritability, and excessively increased motor activity. The peripheral adrenergic effects may cause blurred vision, excessively dilated pupils with photosensitivity, too rapid a heart rate, palpitations, cardiac arrhythmias, and hypertension. The patient often complains of a very dry mouth. Nausea and vomiting, diarrhea, or constipation may all occur. Difficulty in urinating may be due to interference with bladder sphincter control (P. 13 as appeared in Mental Health Digest, 1970, 2).

The authors go on to conclude that these complications have been responsible for the gradual decrease in therapeutic indications for the amphetamines in favor of safer drugs with fewer side effects. To further quote from the article, the authors state that amphetamines are "now indicated in a few rare conditions (Narcolepsy, and some hyperactive brain-damaged children)." The increasing awareness of the dangers of amphetamines was reflected from the market. The British government, for example, cut off methedrine supplies to all

physicians, dentists, and chemists with hospitals given a one year's grace.

Another alerting drug, methylphenidate, at dosages of up to 80 to 100 mg. per day, has been reported to have similar beneficial effects (Knobel, et.al., 1959). In a well-controlled study by Connors and Eisenberg (1963) significant improvement in behavior, learning, and maze performance was demonstrated in a group of emotionally disturbed children following a ten-day period of treatment with methylphenidate. These investigators commented on the wide individual variation in responsiveness among their patients. They cautioned that the practical or clinical value of a drug must be determined in groups of carefully selected patients, and further studies of the personality and other factors influencing responsiveness to the drug are needed before it can be clinically recommended. Another short term controlled study of 30 children with hyperactivity and signs of minimal brain dysfunction has shown that small but measurable improvements attributable to methylphenidate may be expected in tests of general intelligence and visual-motor perception (Millichap, et.al., 1968).

Knights and Hinton (1969) found that methylphenidate apparently improves the attention span of children with behavior and learning disorders. In a double-blind study of

40 children with minimal brain dysfunction using placebo controls over a six-week period, the authors found that both parents and teachers rated the children as being less distractible and more attentive when receiving the drug therapy. The improvement in motor control was considered to be secondary to the improved attention span.

Sprague, Barnes, and Werry (1970) evaluated the effects of methylphenidate in comparison to thioridazine (a tranquilizer) on the behavior of emotionally disturbed, under-achieving boys with a mean age of 94.2 months, and a mean IQ of 98.6. Three dependent measures -- learning (a one-trial learning task), reaction time, and activity level -- were taken in a highly structured laboratory situation. It was found using both laboratory and clinical measures that methylphenidate improved learning performance, while thioridazine decreased learning performance. Also with the improvement in performance, methylphenidate reduced activity. Their findings indicate methylphenidate improved attention. The classroom behavior observation measures corroborated the findings from the laboratory in that methylphenidate increased attention to school work and improved the quality of the child's behavior that day as rated by the teacher.

Despite the numerous clinical reports on the beneficial response to central nervous system stimulants, controlled

studies are limited and there is little satisfactory explanation of the mechanism by which these drugs act. Also, reports are conflicting as to the type of behaviorally disordered child likely to respond favorably. Many investigators consider the central nervous system stimulants are particularly effective in patients with an organic condition but that hyperkinesis attributed to emotional disorder is unresponsive to this therapy (Conrad & Insel, 1967).

A few studies have been discovered that use the drugs commonly classed as monoaminoxidase inhibitors. Freedman (1958) administered iproniazid to a group of autistic schizophrenic children and reported increased awareness of their surroundings and a greater use of language in some. Bender and Faretra (1961) stated that imipramine and the monoaminoxidase inhibitors seem promising in withdrawn, depressed adolescents and autistic children. Fish (1960) in a review of drug therapy in children's behavior disorders stated that the effectiveness of the anti-depressants has not yet been established in these situations. In their study of suicidal attempts in children, Lawler et.al. (1963) reported using imipramine and other anti-depressant drugs in some of their patients but did not give sufficient data to draw any positive conclusions. A different use of imipramine was reported by MacLean (1960) who found it

effective in the treatment of enuresis in children.

A controlled study by Lucas et.al. (1965) was undertaken to evaluate amitriptyline effects on a group of symptoms relating to depression in children. Fourteen children and adolescents were selected from a residential treatment center population and administered the drug in a placebo controlled double-blind study. The subjects were of various neurotic and psychotic diagnoses and ranged in age from 10 to 17. Behavioral changes were rated daily on a four point scale in nine categories. Of the ten patients completing this study, six showed significant improvement by needing fewer external controls or by responding better to controls while receiving the active drug. Two patients needed more control or responded more poorly to controls. Three of the ten patients showed a diminution in the frequency of somatic complaint and two patients participated more easily in activities while one became worse in this category. Peer relationships were rated significantly improved in only two patients. The drug, however, did not appear to diminish severe anxiety or serious acting-out behavior. It was concluded that this drug may be useful in certain carefully selected depressed children but must be considered as only part of a total treatment program.

Krakowski (1964) reports a pilot study with amitriptyline involving 122 randomly selected patients ranging from 2 to 18 years representing various diagnostic categories with behavioral disorders in predominance referred to a child guidance clinic. Varying amitriptyline dosages were administered from 1 to 12 months with observational reports made every week. Habit and conduct disorders appeared to diminish significantly and anxiety and acting-out symptoms as well as some neurotic traits seemed to decrease although there was a confusion with another treatment (psychotherapy) that some chronic neurotics and schizophrenic children were receiving. The same author, however, duplicated the pilot study with a double-blind cross-over controlled study providing a medicated period of 4 to 16 weeks (Krakowski, 1965). Overall satisfactory responses were obtained during drug treatment that was not obtained during the placebo period. The investigator concluded that the study confirmed the results obtained previously during the pilot study and showed amitriptyline to be a safe, active and effective agent markedly reducing symptoms in emotionally disturbed hyperkinetic children when applied as part of a therapeutic approach used in a child guidance clinic.

Kraft et.al. (1966) reports on the use of amitriptyline with 123 children who presented a variety of behavioral and

other disorders. The subjects included 103 boys and 20 girls ranging in age from 2 to 14 who were seen in a child psychiatric clinic and treated on an out-patient basis. The dosage ranged from 30 mg. to 80 mg. daily. The patients' progress was followed closely by phone during the administration of the medication. The overall results were interpreted by the investigators as "promising" since 60 percent of the 123 patients showed improvement as determined by clinical study: This led to the suggestion that physicians consider the drug as a useful agent in treating children with adjustment reactions of childhood and those with maturational brain dysfunction.

Nineteen briefs of research studies of foreign and domestic origin supplied by a pharmaceutical house (Dr. Richard T. Smith, Merck, Sharp and Dohme, Professional Information Consultant) showed 11 studies to favor amitriptyline and proamitriptyline, a derivative of the former, as therapy for enuresis. Most of these studies showed accompanying antidepressant outcomes of positive value. However, three of the studies were conducted with elderly or adult patients as subjects and one study used severely retarded children. The general interpretation seems to be that these drugs can be tried under medical supervision but that drastic side effects might be expected.

One study was found dealing with another drug group, the cholinergics. The effect of deanol on the problem solving and emotional behavior of 42 children between the ages of 6 and 13 was investigated. Both medical and psychological appraisals were used to diagnose central nervous system or behavior disorders. A cross-over, double-blind experimental design was used, with the drug being administered in a dosage of 100 mg. daily. The drugs did not produce significantly different scores on the measures employed, over the scores obtained during placebo treatment. Side effects were non-existing (Kugel & Alexander, 1963).

The data collected and reviewed indicated that methylphenidate is the stimulant drug of choice and that the amphetamines were second in most reported success (Connors & Eisenberg, 1963; Millichap & Fowler, 1967). It is probably fair to say, however, that the use of most of these drugs for behavior disturbances in children with brain damage has rarely been shown to be a completely successful venture unless other medication is administered. Central nervous system stimulants appear to be the agents of choice but further research efforts are necessary before adequate results can be obtained.

## TRANQUILIZERS

Some of these drugs have long been used as anti-anxiety and anti-psychotic agents. Although they can be divided on the basis of chemical structure into many main groups, the derivatives of the phenothiazine compound appear to be most useful in the therapy of the behaviorally disordered child (Kraft & Battin, 1969). Phenothiazines appear very effective in severely disturbed children with "primary behavior disorders" and organic schizophrenic disease (Fish, 1960). Extreme caution is encouraged, however, because of unexpected and erratic behavioral changes (Schiele & Benson, 1962).

Thioridazine has been mentioned as an effective medication in regard to various childhood difficulties such as epilepsy, mental retardation, perceptual disorders, and emotional disturbance (Zarling & Hogan, 1960). In addition, EEG studies have shown significant differences in the response of groups receiving treatment by thioridazine and/or a combination of this drug with diphenylhydantoin, a sedative (Boelhouwer, et.al., 1968; Ingram, 1964). These authors attempted to examine the diagnostic and therapeutic relationship of certain EEG patterns and behavioral disorders. The drug appeared to have a positive effect on both the abnormal EEG pattern and the incidence of behavioral problems.

Additional drugs including chlorpromazine and reserpine, a rau wolfia alkaloid, were also studied but it was concluded that the significance of these effects were not determined and that further studies of the chronic effect of these drugs on electroencephalographic patterns should be completed. (Hollister & Barthel, 1959). The rau wolfia alkaloids are drugs that have less reliable action and are generally reserved for severe schizophrenic disorders which do not respond to phenothiazines. These drugs appear to be much less potent than the phenothiazines, but often produce serious side effects when given in large dosages (Fish, 1963).

Some evidence is existing to show that thioridazine is of benefit in the treatment of patients with mental retardation. LeVann (1961) investigated a group of 97 institutionalized children, comprised of retarded as well as emotionally disturbed cases with adequate intelligence. No side effects, the principal concern of this study, were observed. The writers determined that thioridazine has control over a wide variety of abnormal behavioral patterns in children. They further concluded that medication could be discontinued because the drug aided in breaking the continuum of symptoms and made the children more accessible for other treatment techniques. There appeared to be little difference of effects with retarded or children of average intelligence.

Badham and his associates (1963) treated both child and adult mental deficientes with thioridazine and found it to be effective in controlling behavior disorders in a significant proportion of the patients. They felt this drug was particularly useful with subnormal children.

A smaller but better controlled study essentially produced the same results but the authors noted a significant difference between the level of measured intelligence and response to the drug (Allen et.al., 1963). Children who were moderately and mildly retarded responded significantly better to the use of the drug. Very seriously retarded children did not respond as well.

An evaluation of thioridazine in a series of 141 familial and organic mentally retarded patients ranging in age from 6 to 60 showed the drug to effect improvement throughout the I.Q. level in 54% and marked improvement in an additional 34% of the patients (Abbott et.al., 1965). Hyperactivity, temper tantrums, and self abuse were the symptoms most favorably decreased. There was a relative absence of undesirable drug effects and the effect on behavior encouraged the investigators to suggest thioridazine as a means of facilitating home management of the mentally retarded child so as to avoid commitment to an institution. This same intent was discussed by two medical doctors in their article concerned

with the office management of behavioral disorders (Cettinger & Simonds, 1962). Their presentation of a descriptive study of their use of the drug in medical practice led them to conclude that thioridazine is successful in treating the hyperkinetic behavior problems associated with seizures. They determined that the drug can be faithfully used in pediatric office practice, and will substantially broaden the effective limits of the pediatrician in dealing with children's behavior problems. These conclusions were supported by the findings of a survey of pediatricians in Canada (Doyle, et.al., 1969).

Connors & Eisenberg (1963) report that thioridazine has been valuable in the management of severely retarded individuals in a 1,250 bed institution. Seventy-two percent of the patients receiving the drug were judged to be greatly improved because of the reduction in aggressiveness, hyperactivity, and temper tantrums. Many patients thereby were able to derive greater benefits from the training and other therapeutic programs. The absence of side effects was a noticeable outcome of this drug therapy.

Other literature has shown similar beneficial outcomes. Sandison, et.al., (1960) used four investigative groups including a placebo group and found that only thioridazine gave significant improvement. Hollister and MacDonald (1959),

employing other phenothiazines as active controls, concluded that thioridazine was an active drug with advantages over the other phenothiazines. Ostfeld (1959) reported that over two-thirds of 117 patients were improved when studied under blind placebo cross-over design conditions. He also felt that thioridazine was the least toxic of the phenothiazines. These conclusions were confirmed by Fleeson, et.al., (1958).

A recent double-blind cross-over study undertook to examine the effects of thioridazine and methylphenidate, a stimulant; and a placebo in nine severely retarded males (Davis, et.al., 1969). Thioridazine significantly decreased stereotyped behavior without affecting non-stereotyped behavior. The effect of this drug in the present study lends support to the theory that characterized behavioral arousal as a cause of stereotypy rather than its result.

With regard to the use of thioridazine in epileptics, it should be noted that the phenothiazines have frequently been suspected of being capable of reducing seizure threshold in susceptible subjects. For this reason, it has been considered pertinent to attempt to prevent increase in seizure patterns by withholding the use of these drugs wherever possible and by recommending that anti-seizure medication be continued (Millichap & Fowler, 1967). A previously cited study indicated a reduction in seizure threshold on the

administration of this drug and while the number of cases exhibiting this is extremely small, this led to the recommendation that anti-convulsant medication be maintained or instituted in patients exhibiting overt seizures or suspected of latent epilepsy respectively if thioridazine is to be employed (Hollister & Barthel, 1959).

Experimental studies exploring the effects of phenothiazines on human EEG's have been numerous and quite varied and indicate that alteration of the EEG may take one of two forms. The tranquilizing properties of the phenothiazine appear to be manifest as an effect on the EEG resembling that of light drowsiness from which the subject could be easily aroused. A finding of increased synchronization and normalization of the EEG has been interpreted as indicative of a slight depressant action on the reticular activating system (Itil, et.al., 1967).

A paper by Pauig, et.al. (1961) is particularly interesting because of the attention it devotes to the incidents of epileptic seizures where thioridazine was used for treatment of behavior disorders in such patients. The conclusion was reached that the control of behavior disorders obtained with thioridazine also has a salutary effect on the convulsions previously experienced by the patient but it is important to note that anti-convulsant medication was maintained throughout. It was determined that this protects

the patient against seizures and that combination therapy has greater potential for total rehabilitation of epileptic patients than seizure control therapy only.

Frain (1960) evaluated the use of thioridazine in severely disturbed epileptics with psychoses. Using a group of 70 white females, this investigator charted changes in physiological and psychological behavior during a tranquilizer period, a period of treatment with chlorpromazine, and a treatment period with thioridazine. Physiological symptoms were decreased and positive personality traits were significantly increased during the thioridazine treatment period.

Paulson and Buffaloe (1964) summed up the findings of the previous study when they concluded that ". . .the lack of any apparent epileptogenic effect for more patients appears to make thioridazine a reasonable choice when a tranquilizer is needed for the patient with a seizure tendency." Unfortunately, most of the studies mask the presence of latent activity, as would appear to be the case in some patients exhibiting seizures following the institution of a phenothiazine.

Rinsley (1963) studied 20 adolescent psychiatric in-patients receiving 100 to 800 mg. of thioridazine daily for a two-year period. He concluded that the low incidence of side effects and the great improvement in interactive

relationships with peers and therapeutic staff justified the drug agent as highly effective for this population.

Statistical analysis of the data from a study by Itil et.al. (1967) reveals significant correlation between behavior alterations and EEG changes, both qualitatively and quantitatively. Twenty behaviorally disturbed children and adolescents with abnormal EEG's were treated with a combination of the diphenylhydantoin and thioridazine. Behavior was rated before and three months after drug treatment. EEG recordings were carried out at the same time behavior ratings were done. Three months after treatment, fifteen patients showed moderate to marked improvement, and fourteen of them were discharged. Although only a pilot study, it does substantiate previous findings that indicate that behavioral disorders and EEG patterns are linked.

It appears in recent years that the use of a major tranquilizer, thioridazine, in childhood behavior disorders has been extensively investigated. As a result, this drug has been recommended as an effective agent with a minimal incidence of side effects. It is apparent from this overview that this drug can be considered to be in continued use by a number of medical people in maintaining control with a number of behaviorally disordered children, but its effect on what occurs in the classroom and as a result of educational intervention need not be of primary concern.

Studies concerning some of the minor tranquilizers have also been reviewed and it is found that these drugs are primarily useful in mild to moderately severe neurotic and "primary behavior disorders" (Fish, 1963). Prepuberty children do not appear to become addicted or "drug regulated." Children with moderately severe and schizophrenic reactions are frequently helped by these medications (Fish, 1960). Trifluoperazine is reported as having extra strong stimulatory effects on severely withdrawn and autistic children (Fish, 1963). However, Smith (1965) finds that this drug given in doses ranging from 1 mg. to 15 mg. daily brought varying degrees of improvement to 30 of 38 emotionally disturbed children. All 38 of the patients were considered moderate to severe behavior problems, expressed in hyperactivity, aggressiveness, insomnia, nightmares, and sometimes bedwetting. Therapy with trifluoperazine helps make these children receptive to counseling and other supportive measures; schooling, work therapy, and interpersonal relations. Chlordiazepoxide, another phenothiazine, has been favorably compared to some of the better known chemotherapeutic agents but some studies have indicated that this drug has adverse excitatory effects (Fish, 1969; Zrull et.al., 1963).

The diphenylmethanes, another minor tranquilizing drug group, also are used in therapy for children. Diphenylhydramine has been used successfully for over a ten-year

period to treat behaviorally disordered and emotionally disturbed children (Denhoff, 1961; Fish, 1960). This drug has been found most useful in behavior disorders associated with hyperactivity, to reduce anxiety in very young children who are not hyperactive, and helpful in controlling moderate schizophrenic disorders. Little side effects other than fatigue have been found. Therefore, it is used also as a bedtime sedative (Fish, 1960). Hydroxyzine and azacyclonol are similar compounds but appear to be slower acting and weaker in effects (Fish, 1963). Meproamate, a propanediol, is reported as effective with neurotic and behavior disorders including those associated with mild organic brain disease (Bender & Nightern, 1956). It appears less effective for hyperactive syndromes than the diphenylmethanes (Fish, 1963).

A recent review of additional anti-anxiety and anti-psychotic agents included fluphenazine hydrochloride and chlorprothixene hydrochloride, promazine hydrochloride and thiorpropazate. These drugs were tried on too few patients for adequate appraisal, however (Millichap & Fowler, 1967).

It appears quite apparent that the use of these drugs in therapy for the behaviorally disordered child is widespread. Pediatric and clinical practice as well as pharmaceutical research has more than adequately indicated the advisability of drug therapy with many types of behavior problems.

## SEDATIVES

The use of sedatives or anti-convulsant medication in children with seizures of any variety, with or without behavioral symptoms, is usually mandatory. In such cases the aim of therapy is seizure control. The main rationale for such therapy is the prevention of the possible organic cerebral deterioration that repeated episodes of anoxia and possible head trauma may cause the patient with uncontrolled epilepsy. The effects of drug control of seizures on the interictal behavior disorders may vary, however. This behavior may worsen, improve, or remain unchanged (Glaser & Dixon, 1956). In general, diphenylhydantoin and primidone are the drugs of choice in psychomotor seizures (Pincus & Glaser, 1966). Phenobarbital often seems to lead to exacerbation of behavioral symptoms although it may be an effective anti-convulsant. Barbituates have been found to increase anxiety and disorganization in severely disturbed children (Fish, 1960).

The place of anti-convulsants in the treatment of children with behavior disorders and abnormal electroencephalograms who have no seizures is less certain. Early studies gave good evidence for use of diphenylhydantoin sodium compounds in the treatment of children whose behavior disorders were not associated with specific EEG abnormalities (Lindsley &

Henry, 1942; Walker & Kirkpatrick, 1947). Later treatments of the use of this sedative do not confirm the earlier findings, however (Fish, 1963; Freeman, 1966).

Green (1961) studied the effect of anti-convulsants on non-epileptic children with behavior disorders associated with a focal electroencephalographic abnormality. Of five children with hyperactivity, short attention span, and intellectual deficits, two were unchanged, two were "less hyperactive," and one "related better." In three others of normal intelligence who had varied behavioral problems, two improved their ability to concentrate and to relate to others. These unimpressive qualitative results are the general experience, and the use of anti-convulsants to modify behaviors in such cases is usually unsuccessful.

Reports of the efficacy of anti-convulsants in the control of hyperactivity are likewise limited and are concerned primarily with trials in children whose behavior and learning problems are complicated by convulsive seizures. Primidone, found effective in 7 of 10 patients in one study, has been recommended for use in children with major convulsions and hyperactive behavior (Millichap & Fowler, 1967).

Diphenylhydantoin sodium was relatively ineffective in two studies that included a total of only 28 patients, but the necessity for further trial is suggested by laboratory

investigations in which locomotor activity of animals was reduced by this and other related compounds (Millichap et.al., 1968).

Gross and Wilson (1964), in a report of ten case studies of medication effects on behavioral outcomes and EEG profiles, determined that some of the amphetamines were useful and that phenobarbital often made the patient worse, but that diphenylhydantoin was rather effective. In fact, these medications were found to be less effective than placebo administrations.

Captodiamine hydrochloride has been reported to be effective in organic brain disorders (Low & Myers, 1958). Forty hyperkinetic children with patterns of organic brain damage were treated with varying doses (10-250 mg. daily) of this drug for a period ranging from 3 to 17 months. Striking improvement in behavior with no significant toxic reactions were documented. Conclusions were drawn giving testimony to the value of this drug for the use with hyperkinetic children with brain damage.

## CONCLUSION

From our review, drugs seem to have a definite, if circumscribed, role to play in helping children overcome and succeed in spite of their learning handicaps. One reviewer provides an encouraging prospective. "Drugs are obviously not panaceas, though our needs and frustrations may incline us to cast them in this image. New and continual work in psychopharmacology and the physiology of learning allows us to have cautiously optimistic expectations for the future." (Freeman, 1966, p.37).

Several comments can be made that are applicable to the general area of psychopharmacology. As we have learned from this review, most of the available research has dealt with problems that are of a clinical nature. Research regarding the effects of drugs on the learning process is very limited. Freeman (1966) pointed this out after reviewing the research for the past thirty years. Werry and Quay in 1970 also speak to corroborate the need. More studies are needed that employ one or more facets of the learning process as a dependent measure in drug evaluation. Even in those studies using some aspect of the learning process as a dependent measure, it is common to find that the criteria employed is timebound, the task artificial, and occurring in a laboratory situation. Hence

generalizability to the classroom setting is often impaired. Also, much of the available research has used unrepresentative Ss especially in view of the populations to which the experimenters hope to generalize. The choice of Ss in most studies come from adult populations (Alderton & Hoddinott, 1964; Connors & Eisenberg, 1963). Conspicuously scarce in this field are longitudinal studies that attempt to assess long-term effects of a particular drug action. Studies focusing on the synergistic effects of drugs used in combination are also limited. Likewise, so many threats to internal validity make many studies uninterpretable. For example, validity factors of history, maturation, instrumentation, mortality, testing, and regression are often not controlled for.

There are also methodological considerations that are particularly relevant to control for in research dealing specifically with assessing the effects of psychopharmacology. Sprague, et.al. (1970) list three of the common sources of error as:

1. Observer bias.
2. Use of error-prone and/or insensitive measures.
3. Ignoring the necessity for optimal drug dosage; for testing at the height of drug action; and to be sure that medication is both being taken and at the time indicated.

The writer's see reason for optimism in regards to these three sources of error being controlled. A definite, observable trend in this direction of better controlled and more sophisticated studies is appearing and is reflected by the recent research publications in this area.

In summary, it appears that the effect drugs have on intellectual functioning still has to be determined. There was little evidence uncovered in this survey to indicate that the learning process is consistently and reliably affected in certain predictable ways. At this point it might be tentatively concluded that the most effective way to evaluate the drug medicated child psychologically is to be more concerned about his observed and manifest behavioral symptoms and not to depend too completely on expected drug induced changes. It seems highly advisable that the psychologist be aware when a subject is receiving drug medication as well as the drug name and dosage. With this knowledge and the awareness of possible effects and using appropriate clinical skill, the experienced psychologist could serve as a more effective resource for teachers, parents, para-professionals, etc., in assessing individual learning modes that can help provide the best educational placement and provisions.

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## APPENDIX

### I. Stimulants (Activators)

Amphetamine (Benzedrine)  
Dextroamphetamine (dexedrine)  
Methamphetamine (Methedrine)  
Methylphenidate (Ritalin)  
Pipradrol (Meratran)  
Iproniazid (Marsilid)  
Isocarboxazid (Marplan)  
Nialamide (Niamid)  
Tranylypromine (Parnate)  
Diisopropyl fluorophosphate (DFP)  
Eserine  
Orphenadrine (Disipal)

### II. Tranquilizers (Anti-anxiety - Anti-psychotic)

Azacyclonol (Frenquel)  
Benactyzine (Deprol, Suavitil)  
Captodiamine (Suvren)  
Hydroxyzine (Atarax, Vistaril)  
Deserpidine (Harmonyl)  
Rescinnamine (Moderil)  
Reserpine (Sepsal)  
Chlordiazepoxide (Librium)  
Chlorpromazine (Thorazine)  
Mepazine (Pacatal)  
Perphenazine (Trilafon)  
Prochlorperazine (Compazine, Stemetil)  
Promazine (Sparine)  
Promethazine (Phenergan)  
Thiopropazate (Dartal)  
Thioridazine (Mellaril)  
Trifluoperazine (Stelazine)  
Triflupromazine (Vesprin)  
Meprobamate (Miltown, Equanil)

Appendix (continued)

III. Sedatives (Anticonvulsants)

Phenaglycodol (Ultran)  
Butabarbital Sodium (Butisol Sodium)  
Pentobarbital Sodium (Mebutal)  
Phenobarbital (Luminal)  
Secobarbital Sodium (Seconal)  
Amobarbital Sodium (Amytal Sodium)  
Captodiamine (Suvren, Covatix)  
Diphenylhydantoin sodium (Dilantin)  
Ectylurea (Nostyn)  
Ethchlorvynol (Placidyl)  
Glutethimide (Doriden)  
Meparfynol (Dormison)  
Methyprylon (Noludar)  
Oxanamide (Quiactin)  
Primidone (Mysoline)

were so small, these data do not merit interpretation. Furthermore, none of the C teachers was rated as using the inductive method.

The mean rating for the type of teaching method used for management by the E group was 3.11 and 2.68 for the C group. Although the C teachers tended to be more rote oriented, this difference was not significant.

The mean rating for the type of teaching method used for all areas combined was 3.21 for the E group and 2.86 for the C group. This trend for the E group to be less rote oriented than the C group was not significant. However, the consistent trend for the E teachers to be more inductive than the C teachers regardless of subject matter is worth noting.

Those teachers who used the inductive method were then rated on the appropriateness and correctness of application. The mean ratings for the appropriateness and correctness in the use of the inductive method in the academic areas ranged from 3.85 to 4.17 for E group, indicating that the method was generally used appropriately and correctly.

The E teachers' ratings on the appropriateness and correctness of their use of the inductive method in non-academic ranged from 3.00 to 3.83 with a mean of 3.50 which represents a rating of usually appropriate. C teachers did not qualify for ratings on this aspect

because they did not use the inductive method to criterion (see Appendix E).

The E teachers obtained an average rating of 4.10 and the C teachers 4.50 on the appropriateness and correctness of their use of the inductive method in management areas. This represents a rating of almost always being appropriate. The N for the C group was two; thus, this average rating must be viewed cautiously. The difference of the E and C groups was not significant.

The mean ratings on the appropriateness and correctness of the use of the inductive method for all areas combined was 4.06 for the E group and 4.10 for the C group. The rating for the C group was based on an N of 2. The difference between the two groups was not significant. From these data it can be concluded that when the E and C teachers used the inductive method they usually used it appropriately and correctly; however, the E teacher used the method more than the C teachers.

On the degree to which the teachers organized the stimuli in the teaching situation, the E group received a mean rating of 3.81 and the C group 3.48. This difference was not significant and it can be concluded that both groups usually organized the stimuli in the teaching situation and did so to comparable degrees.

In terms of the relevance of the teachers' cues to the children's vocabulary levels, the E teachers received a mean rating of 3.79 and the C teachers 3.40. Although there was a tendency for the E teachers to select cues at a more appropriate vocabulary level than the C teachers, this difference was not statistically significant. The E teachers received a mean rating of 3.82 on the relevance of the cues selected in relation to the children's experiential background, while the C teachers obtained a mean rating of 3.21. This difference was statistically significant ( $t = 2.31$ ;  $p .05$ ). Thus, the E teachers were more accurate in their selection of cues consonant with their student's experiential background.

The E teachers were rated 3.75 on the appropriateness of the reinforcement they gave and the C teachers 3.54. This difference was not significant. Thus, both groups tended to give reinforcement which was usually appropriate to the situation.

On the three items involving the teachers' responses to incorrect student responses there was a trend for the E teachers to obtain higher rating than the C teachers. The E teachers obtained a rating of 2.97 on their requests for children to evaluate their correct responses and the C teachers 2.51. This indicates that the E teachers tended to involve the children in the evaluation of their responses more than the C teachers; however, this trend was not statistically significant. On restructuring the teaching situation following an erroneous student

response, the E teachers obtained a mean rating of 2.87 and the C teachers 2.58. Although the E teachers' rating was higher, this was not significantly so. The E group obtained a mean rating of 3.62 on rephrasing questions after erroneous responses and the C group 3.10. This difference was statistically significant ( $t = 2.00$ ;  $p .05$ ).

On the item assessing whether the teachers provided the opportunity for the children to discover the generalization, the E group received a mean rating 2.78 and the C group 2.26. Although there was a trend favoring the E teachers to provide more opportunities for the discovery of generalization, this was not statistically significant. Both groups rarely provided such opportunities for discovery. This was the most important element of the induction method.

Insofar as closing a teaching sequence was concerned, the E and C teachers rarely asked the pupils to summarize. They received ratings of 2.30 and 2.06, respectively. This difference was not found to be significant. When the teacher took it upon himself to close the sequence by summarizing, the E group received a rating of 3.08 and the C group 2.84, which also was not significant. When sequence were purposefully closed, this was more often done by the teachers in the E group.

In summary, the E teachers obtained significantly higher ratings than the C teachers on five of the 32 items on the rating scale on the inductive method. In 28 comparisons, the E teachers were superior in 21, although the E group did not use the inductive

method consistently nor completely, they did use it more than the C group.

### Tape Recordings

The results of the analysis of the tape recordings are presented in Tables 14, 15, 16, and 17. If the E teachers were using the inductive method, they should have used significantly more structuring-integrative, reacting-evaluation, reacting-restructuring statements. They should have used fewer structuring-memory, reacting-correcting, and information statements. Also, the E students should have given significantly more responses of the integrative type and evaluations than did the C students. The E students should have given fewer responses of the memory type.

The percent of E and C teacher statements for language arts and arithmetic is presented in Table 14. None of the differences was significant. However, there was a trend for the C teachers to have more structuring-memory statements than the E teachers in both subjects. The E teachers had more structuring-integrative statements in arithmetic. In both subjects the E teachers restructured their students after incorrect responses more than the C teachers. This trend supports the results on this item from the consultant rating scale.

In Table 15 the percent of E and C teacher statements in the various categories for the social learning is shown. There were no

Table 14

Per Cent of E and C Teacher Statements in Tape Recording  
Categories -- Language Arts and Arithmetic

Category	Language Arts			Arithmetic						
	E Group $\bar{X}$	S.D.	C Group $\bar{X}$	S.D.	E Group $\bar{X}$	S.D.	C Group $\bar{X}$	S.D.	t	
Structuring memory	21.53	7.42	24.86	4.30	-1.10	19.00	7.25	25.29	7.82	-1.87
Structuring integrative	2.76	1.81	2.71	1.25	.06	5.69	4.78	2.86	1.95	1.50
Structuring total	23.94	6.98	27.14	4.88	1.09	24.50	6.34	27.71	6.18	-1.01
Reacting-positive reinforcement	15.76	4.83	17.43	4.69	-.77	17.50	5.03	19.86	5.70	-1.00
Reacting-negative reinforcement	3.94	2.01	3.71	2.99	.22	2.94	1.80	3.14	1.95	-.24
Reacting-neutral reinforcement	11.41	4.99	13.14	5.37	-.75	12.94	4.05	14.43	5.44	-.67
Reacting-evaluation	2.53	1.37	2.14	1.46	.61	3.19	2.32	3.00	1.41	.20
Reacting-correcting	2.76	2.11	3.14	2.27	-.39	1.31	.87	1.14	.38	.47
Reacting-restructuring	31.82	6.42	27.29	8.48	1.43	30.81	7.60	26.14	2.54	1.40
Reacting - total	67.94	7.46	65.57	5.56	.75	67.38	7.95	66.14	8.68	.34
Information	3.82	2.29	4.57	1.81	-.76	3.31	1.74	2.57	1.40	.99
Routine-management	3.94	2.24	2.43	1.26	1.79	4.31	2.27	2.86	2.79	1.32
Routine-discipline	1.76	1.60	2.14	4.38	-.31	1.81	1.05	2.29	1.97	-.62
Routine-total	5.24	2.76	4.29	5.28	.58	5.56	2.47	4.86	4.30	.50

Table 15

Per Cent of E and C Teacher Statements in Tape Recording  
Categories -- Social Studies and all Subject Matters Combined

Category	Social Learning				All Subject Matters Combined				
	E Group		C Group		E Group		C Group		t
	$\bar{X}$	S.D.	$\bar{X}$	S.D.	$\bar{X}$	S.D.	$\bar{X}$	S.D.	
Structuring-memory	19.31	7.32	18.57	4.72	19.47	5.06	24.43	4.96	-2.19 <sup>a</sup>
Structuring-integrative	3.89	3.34	3.57	3.26	4.06	2.19	3.29	1.49	.84
Structuring-total	23.19	7.04	22.00	5.77	23.71	4.06	27.14	4.60	-1.81
Reacting-positive reinforcement	15.63	15.40	17.86	6.94	16.06	3.61	18.00	4.76	-1.07
Reacting-negative reinforcement	3.38	3.30	1.43	1.27	3.53	1.54	3.29	1.98	.32
Reacting-neutral reinforcement	15.50	5.22	15.43	8.92	13.47	3.94	14.43	5.43	-.48
Reacting-evaluation	1.69	1.58	1.43	.79	2.88	1.45	2.57	1.27	.49
Reacting-correcting	1.88	1.31	2.29	1.49	2.29	1.16	2.00	1.00	.58
Reacting-restructuring	29.81	7.99	28.71	8.10	30.59	4.96	26.43	5.32	1.83
Reacting-total	67.25	7.36	66.71	5.53	69.82	4.73	65.29	5.53	1.13
Information	5.38	3.24	6.14	3.98	4.59	1.70	4.00	1.63	.79
Routine-management	2.94	2.72	2.86	2.03	3.88	2.12	2.71	1.60	1.31
Routine-discipline	1.94	1.91	2.57	4.20	1.94	1.20	2.29	2.98	-.43
Routine-total	4.56	3.33	5.29	5.71	5.24	2.36	4.11	-1.50	.38

<sup>a</sup>Significant at .05 level with two-tailed test.

Table 16

Per Cent of E and C Student Statements in Tape Recording  
Categories -- Language Arts and Arithmetic

Category	Language Arts			Arithmetic						
	E Group $\bar{X}$	S.D.	C Group $\bar{X}$	t	E Group $\bar{X}$	S.D.	C Group $\bar{X}$	t		
Response-memory	60.12	8.99	60.00	18.79	.02	55.13	14.62	65.29	13.85	-2.14 <sup>a</sup>
Correct	47.06	8.72	49.86	16.23	-.55	44.81	13.51	55.86	13.61	-1.80
Incorrect	13.24	4.25	10.29	5.65	1.40	10.56	7.61	9.86	2.19	.24
Response-integrative	5.65	4.48	6.57	4.03	-.46	13.00	10.50	10.71	13.56	.44
Correct	4.29	3.71	5.29	3.45	-.61	9.75	8.28	8.57	10.40	.29
Incorrect	1.41	1.54	1.57	.53	-.26	3.19	3.43	2.29	3.55	.57
Response-indeterminate	11.94	4.63	14.86	12.25	-.86	8.75	3.97	8.71	3.59	.02
Response-total	77.18	6.19	81.86	9.39	-1.34	76.44	7.97	84.14	9.68	-2.00
Correct	50.65	8.07	55.00	17.41	-.84	53.44	9.04	64.14	11.81	2.38 <sup>a</sup>
Incorrect	14.88	3.89	11.71	5.68	1.57	13.56	7.69	12.00	2.31	.52
Evaluation	2.94	1.87	2.43	2.37	60	3.25	2.21	4.29	2.29	-1.03
Spontaneous-question	1.94	1.09	2.14	1.46	-.37	2.44	1.26	1.29	1.80	1.08
Spontaneous-statement	5.06	3.93	3.86	4.26	.65	8.63	7.74	5.14	5.30	1.26
Spontaneous-total	7.00	4.82	5.43	5.47	.69	10.56	8.26	6.14	6.20	.65
Routine	3.76	2.86	2.14	3.13	1.22	3.88	2.60	3.00	3.75	.84
No Response	7.00	3.61	7.57	4.99	-.31	5.00	3.86	3.71	1.60	1.46

<sup>a</sup>Significant at .05 level with two-tailed test.

Table 17

Per Cent of E and C Student Statements in Tape Recording Categories -- Social Studies and all Subjects Combined

Category	Social Learning			All Subject Matters Combined						
	E Group $\bar{X}$	S.D.	C Group $\bar{X}$	S.D.	t	E Group $\bar{X}$	S.D.	C Group $\bar{X}$	S.D.	t
Response-memory	51.75	10.48	50.43	24.64	.18	54.71	7.28	59.71	15.79	-1.08
Correct	44.13	10.39	44.57	25.45	-.06	44.88	7.66	50.71	15.39	-1.25
Incorrect	7.44	4.08	5.86	3.39	.89	10.53	2.83	9.43	2.64	.88
Response-integrative	11.81	8.29	10.86	9.46	.24	9.44	5.98	10.00	5.80	-.02
Correct	9.75	7.01	10.14	8.41	.11	7.88	4.97	8.43	4.79	-.24
Incorrect	2.31	1.92	.71	1.11	2.04	2.35	1.66	2.14	1.34	.30
Response-indeterminate	14.25	4.97	14.00	6.64	.10	12.18	3.17	13.00	7.02	-.40
Response-total	77.56	7.34	75.29	18.03	.43	74.12	10.60	82.29	9.76	-1.93
Correct	53.75	8.93	54.71	24.52	-.14	49.82	10.37	58.57	15.94	-1.60
Incorrect	9.63	3.89	6.57	3.46	1.78	12.71	3.40	11.29	2.93	.97
Evaluation	1.69	1.49	2.71	2.43	-1.24	2.88	1.27	3.29	2.14	-.59
Spontaneous-question	1.50	1.41	.43	.79	1.88	2.00	.71	1.29	1.38	1.88
Spontaneous-statement	8.88	5.56	7.86	11.52	.35	7.71	5.37	5.29	5.09	1.63
Spontaneous-total	10.31	6.80	8.43	12.24	.47	10.41	5.84	6.43	6.37	1.48
Routine	3.38	4.63	3.43	3.31	-.02	3.71	2.57	2.57	3.10	.93
No response	4.81	2.70	6.00	2.94	-.94	5.65	2.71	5.29	2.22	.31

significant difference between the groups on any categories. Also in Table 15 the results for all subject matters combined are shown. As predicted, the E group obtained significantly less structuring for memory statements than the C group ( $t = -2.19$ ;  $p .05$ ). There was a trend, which was not significant, for the E teachers to re-structure more than the C teachers.

In Table 16 the percent of E and C students' statements in each of the categories of the classification system for language arts and arithmetic is shown. There was no significant difference between the groups in language arts. In arithmetic the E students gave significantly more structuring for memory responses. There was a trend for the C students to give more total responses, and there was a significant difference between the number of total correct responses in favor of the C group ( $t = -2.38$ ;  $p .05$ ).

In Table 17 the analysis of student utterances in social studies and for all subject matters combined is shown. No significant differences were found between the groups in social learning. The significant differences found in arithmetic were found in the form of trends for all subject matters combined.

In summary, the results of the tape recording seemed to indicate that the C teachers were somewhat more rote in their teaching method than the E teachers. Thus the C students gave more rote responses.

More of the C students' responses were correct because rote responses are probably easier than integrative responses.

The results of the consultant rating scale and the tape recordings indicate that most of the E teachers used some aspect of the inductive method. Thus, Hypothesis II was supported but with the reservations consistent with the nature of the data.

#### Integration of Observations

The results of the rating scale indicated that while not all of the E teachers used the method consistently or completely, they did use it more than did the C teachers. On the other hand, the results of the tapes showed no noteworthy differences between the E and C teachers or children. From the subject assessment by the consultants and the measurement supervisor it was found that seven of the seventeen E teachers and one of the seven C teachers used the method. From these three sources of data it might be concluded that some of the E teachers used the method and some did not, while practically none of the C teachers used it. When the E group was considered as a whole, the teachers who did not use the method neutralized the effects of those who did use it. It is of importance to note that when the inductive method was used, it was used by the E teachers and not the C teachers.

### Teacher Change Rating Scale

Since the instrumentation of this study was developed during the course of the study, there was no opportunity for pre-testing the teachers on many of the factors fundamental to the hypotheses. A teacher change rating scale was constructed to accommodate the observations of the consultants regarding the degree of change of the teachers over the term of the study. The data derived from this scale are shown in Table 18. At the start of the study over 80% of the teachers were either not using the inductive method or using it inappropriately and were rated as needing considerable help toward making a change. By the end of the study 69% of those needing change made some positive change, while 31% made either no change or changed negatively. However, by the end of the study 59% of the teachers were still in need of guidance on use of the method. Thus, it seems that most of the E teachers needed much guidance in the use of the inductive method at the start of the study. During the course of the study they made considerable progress in learning to use the inductive method; however, this progress was not sufficient and at the end of the study 88% were rated as needing help in instituting the social learning curriculum. Seventy-five percent made positive change; however, at the end of the study 52% were still in need of guidance.

These ratings for the social learning curriculum are similar to those for the inductive method.

Only 42% of the E teachers were rated as needing improvement in their ability to handle classroom management problems at the beginning of the study. This is a smaller percentage than the ratings for the inductive method and curriculum. It is clear that these teachers had less difficulty with management than with pedagogic problems. Of the 42% who needed change, 67% made positive change. At the end of the study 77% did not need the consultant's guidance in handling management problems. Thus the E teachers, as a whole, were better able to handle management problems, made considerable progress, and showed a great deal of independence in this area at the end of the study.

Seventy-six percent of the E teachers implemented appropriately the consultant's recommendations while twelve percent paid no attention to them and another twelve percent misinterpreted them.

As the start of the study 77% of the E teachers were realistic about their need for help and requested assistance from the consultants. Six percent who needed help did not ask for assistance, and eighteen percent asked for more help than their situation required. At the end of the study, 88% of the teachers asking for help were rated as realistic about their needs for help.

Table 18

Distribution of Ratings for E Teachers  
on Teacher Change Rating Scale (N=17)

<u>Item</u>	<u>Percent of Teachers Receiving Each Rating<sup>a</sup></u>				
	Rating 1.	Rating 2	Rating 3	Rating 4	Rating 5
1. Change in use of inductive method needed.	18	35	29	12	6
2. Change in use of inductive method made.	6	0	25	50	19
3. Independence in use of inductive method at end of study	12	18	29	18	24
4. Change in use of curriculum needed	18	29	41	6	6
5. Change in use of curriculum made.	6	6	13	44	31
6. Independence in use of curriculum at end of study.	24	12	18	24	24
7. Change in use of management needed.	12	12	18	29	29
8. Change in use of management made.	0	8	25	50	17
9. Independence in management at end of study.	0	12	12	12	65
10. Implements consultant's recommendations	6	6	12	41	35
11-a. Teacher's requests for consultant's assistance at start of study.	12	6	6	65	12
11-b. Teacher's requests for consultant's assistance at end of study.	6	6	0	53	35
12-a. Teacher receptivity to consultant -- at start of study.	6	18	6	47	24
12-b. Teacher receptivity to consultant -- at end of study.	6	6	18	24	47

<sup>a</sup>Rating of 5 is high and 1 is low.

At the start of the study 24% of the teachers were openly receptive to the consultant's recommendations while 47% were cautiously receptive. By the end of the study these proportions were reversed. At the beginning of the study six percent were indifferent to recommendations, six percent skeptical, and eighteen percent antagonistic. By the end of the study, among those with negative attitudes, the shift was toward acceptance of the consultant.

To determine whether attendance at training sessions was related to the degree of teacher change over the course of the study, Pearson Product Moment Coefficients of Correlation for each item of the teacher change rating scale and attendance rate were obtained. The correlations ranged from  $-.33$  to  $.43$ . Only one correlation, that between the incidence of teacher's requests for the consultant's assistance at the start of the study and attendance rate, was significant. This indicates that those teachers who most expressed need for help followed through in this search throughout the two years of the study.

#### Correlation of the Teachers' Use of the Social Learning Curriculum and Inductive Method

Hypothesis III. There will be a significant positive correlation between the use of the curriculum and the application of the method. To test this hypothesis it was necessary to rate the teachers as either

using the curriculum or not using the curriculum regardless of E or C group membership. The teachers were then evaluated as to their application of the teaching method.

Of the 24 teachers seven were judged as using the curriculum and eight as using the method. Of the eight using the method, six were found to be using the curriculum also. A phi correlation of .71 was obtained for the variables of the teacher's use of the method and curriculum. This was significant at the .01 level, thereby supporting the hypothesis. Thus, the teachers who used the inductive method generally used the social learning curriculum also.

#### E and C Student Performance

Hypothesis IV. The E students will obtain significantly higher scores than the C students on tests of intellectual development, academic achievement, social learning, personality development, and divergent thinking. One way of measuring teacher efficacy in implementing the curriculum and method is in the progress their students made on tests of intellectual development, academic achievement, personality development, and cognitive style.

#### Achievement Tests.

In Table 19 the pre-test, post-test, and difference scores on the M.A.T., Lee-Clark and TOBI for the E and C groups are presented.

Table 19

Pre-test, Post-test, and Difference Scores for M.A.T., Lee Clark, TOBI, and P.P.V.T., for E and C Groups (N = 148)

Test	E Group (N = 116)				C Group (N = 32)				t of Difference Scores				
	$\bar{X}$	S.D.	$\bar{X}$	S.D.	Pretest	Difference	Post-test	Difference					
M.A.T. (grade equivalent)	1.57	.56	2.00	.70	.43	.38	1.54	.53	1.92	.63	.38	.45	.59
Word knowledge	1.58	.64	2.16	1.03	.58	.63	1.58	.51	1.88	.75	.29	.42	2.47 <sup>a</sup>
Reading	1.46	.48	1.78	.83	.32	.61	1.50	.46	1.86	.60	.36	.36	-.37
Arithmetic	1.49	.60	1.87	.84	.37	.58	1.47	.53	1.67	.58	.20	.34	1.59
Lee Clark <sup>b</sup> (grade equivalent)	1.13	.62	1.22	.59	.09	.40	1.22	.59	1.53	.55	.31	.48	-.81
TOBI (raw score)	17.49	8.31	23.77	8.15	6.28	4.63	16.91	6.01	23.38	7.19	6.47	5.32	-.25
P.P.V.T. I.Q.	74.37	12.31	75.02	13.00	.65	10.66	73.03	13.42	72.44	11.66	-.59	12.28	.30
P.P.V.T. M.A. (in months)	78.47	19.94	90.61	22.61	12.14	15.29	80.22	14.78	87.28	12.14	7.06	17.82	1.16

<sup>a</sup>Significant at .05 level with two-tailed test.

<sup>b</sup>N for E group = 47 and for C group = 12.

Both groups scored at the mid-first grade level on the four M.A.T. sub-tests on pre-testing. On post-testing the two groups scored at the late first and early second grade levels. The groups made from one-fifth to one-half year progress from pre- to post-testing, which is not inconsistent with the rate of development expected on the basis of their I.Q.'s. On the word discrimination sub-test the E group made a significantly greater gain than the C group ( $t = 2.47$ ;  $p .05$ ). There were no significant differences between the two groups on the gain scores for the other three sub-tests.

On the Lee-Clark both the E and C groups scored at the beginning first grade level. On post-testing the C group made one-half year progress and the E group made one-tenth year progress. This trend for the C group to make a greater gain than the E group was not significant.

#### Social Learning Test.

Each group obtained an average raw score of 17 on the TOBI pre-test. Each group made a six-point gain on post-testing. The t value for gain scores for the E and C groups was not significant.

#### Intelligence Tests.

It can be noted from Table 19 that on pre-testing the E group obtained a mean P.P.V.T. I.Q. of 74.37 and the C group 73.03. On

post-testing, the E group gained one point while the C group lost one point. This difference was not significant. The P.P.V.T. M.A. on pre-testing was 78 months or 6-6 for the E group and 80 months or 6-8 for the C group. The E group had a gain score of one year while the C group had a gain score of seven months. The difference between these gain scores was not significant.

#### Personality Tests.

On the response set questionnaire the E group obtained an average of 9.19 correct responses and the C group 9.44 on the last ten items. This difference was not significant. Neither group seemed to be negatively affected by whatever frustration were generated.

In Figure 1 the mean number of correct responses to the reinforced choice during each block of 20 trials of the probability learning task for the E and C groups is shown. The E group made an average of nine correct responses on the first block and gradually increased to a mean of twelve on the last block. The C group which began with a mean of eight correct responses followed a similar upward pattern over the five blocks and ended with a mean of ten correct responses. A Lindquist Type I analysis of variance (Lindquist, 1953) was applied to these data. The analysis of variance table can be found in Table 20. A significant difference was found between the E and C groups ( $F = 9.953$ ;

p .005). Thus, contrary to the original prediction, the E students made more responses to the partially reinforced choice than did the C group.

#### Divergent Thinking Tests.

The divergent thinking scores for the E and C groups are shown in Table 21. On the Mother Hubbard Test the mean fluency score of 3.17 for the E group was significantly greater than the C group mean of 1.88 ( $t = 2.37$ ;  $p .05$ ). The originality scores did not significantly differ. There were no significant differences between the two groups on the three measures of the Product Improvement Test. The mean scores of the E group were higher than those of the C group on the three measures of the Unusual Uses Test; however, only the originality score proved to be statistically significant ( $t = 2.10$ ;  $p .05$ ). The E group's mean fluency score for the three tests was significantly larger than the C group's ( $t = 2.24$ ;  $p .05$ ). Although the E group's mean originality and flexibility scores were larger than the C group's, these differences were not found to be statistically significant.

#### Summary of Student Test Data.

In summary, the data on the achievement tests showed that in general there were no significant differences between the E and C groups at the end of the study except for the word discrimination test.

Table 20

Analysis of Variance of the Number of Correct Responses  
Made by E and C Groups on Probability Learning Task

<u>Source of Variation</u>	<u>Sum of Squares</u>	<u>Degrees of Freedom</u>	<u>Mean Square</u>	<u>F</u>	<u>P</u>
<u>Between Subjects</u>	20931.302	147			
Treatment Group (A)	1335.818	1	1335.818	9.953	.005
Error (1)	19595.484	146	134.216		
<u>Within Subjects</u>	3339.200	592			
Blocks (B)	300.772	4	75.193	14.626	.005
Interaction	35.966	4	8.992	1.749	.25
Error (2)	3002.462				
<u>Total</u>	24270.502	739			

Table 21  
Divergent Thinking Scores for  
E and C Groups (N = 148)

<u>Test</u>	<u>E Group (N=106)</u>		<u>C Group (N=32)</u>		t
	$\bar{X}$	S.D.	$\bar{X}$	S.D.	
Mother Hubbard-fluency	3.17	2.89	1.88	1.96	2.37 <sup>a</sup>
Mother Hubbard-originality	4.33	4.06	3.19	3.55	1.43
Product Improvement-fluency	6.41	4.96	5.59	4.02	.84
Product Improvement-originality	3.90	3.82	3.66	3.12	.32
Product Improvement-flexibility	2.84	1.89	2.50	1.52	.93
Unusual Uses-fluency	6.11	4.63	4.44	4.06	1.84
Unusual Uses-originality	2.53	3.20	1.25	2.24	2.10 <sup>a</sup>
Unusual Uses-flexibility	3.20	2.56	2.31	1.82	1.82
Mean fluency	5.24	3.33	3.78	2.81	2.24 <sup>a</sup>
Mean originality	3.57	2.67	2.62	2.58	1.76
Mean flexibility	3.02	1.93	2.41	1.46	1.65

<sup>a</sup> Significant at .05 level with two-tailed test.

No differences were found for intellectual development as measured by the P.P.V.T. On the probability learning task the E group scored significantly higher than the C group. No differences on the other personality measure, response set, were found. On the tests of divergent thinking, three of the eleven scores were significantly higher for the E group. On the basis of these results Hypothesis IV must be rejected.

#### Teacher Background Characteristics and Teacher Performance

Hypothesis V. Teacher background characteristics will be correlated with the teacher's use of the curriculum and method.

Age. There will be a significant positive correlation between age and the use of the curriculum and method. The point biserial correlation between the teachers' age and their use of the inductive method was .11. The correlation for age and use of the curriculum was .10. Neither of these correlations was significant; thus, age does not seem to be related to teaching performance.

Professional preparation. Teachers trained in special education will use the curriculum and method more than teachers trained in other areas of education. Teachers trained in other areas of education will use the curriculum and method more than teachers with no training in education. Teachers trained in other areas of education will use the

curriculum and method more than teachers with no training in education. It was not possible to analyze the special education, education, and non-education groups because the expected frequency requirement of the  $X^2$  test could not be met. The special education and education groups were combined and compared with the non-education group on their use of the curriculum and method with the Finney method of the Fisher Exact Probability Test (Finney, 1948). No significant differences were found between the groups for either the method or the curriculum; therefore, the hypothesis was not supported.

Teacher experience with the mentally retarded. There will be a significant positive correlation between the number of years teaching the mentally retarded and the use of the curriculum and method. The point biserial correlation for teaching experience and use of the method was .18 and for use of the curriculum .20. Neither was significant; therefore, the hypothesis was not supported.

Teaching experience with normals. There will be a significant negative correlation between the number of years teaching normals and the use of the curriculum and method. The point biserials for teaching experience with normals and the use of the curriculum and method were .09 and .16 respectively. Neither was negative nor significant, thereby not supporting the hypothesis.

Variety of teaching experiences. Teachers experienced only with the mentally retarded will use the curriculum and method more than teachers with mixed experiences (i.e., experienced with the mentally retarded and normals). The expected frequency requirement of the  $X^2$  test could not be met; therefore, the Finney method of the Fisher Exact Probability test was used. No significant differences for variety of teaching experience and use of curriculum or method were found. This hypothesis was not upheld.

Total years of teaching experience. There will be a significant positive correlation between the total number of years teaching and the use of the curriculum and method. The point biserial correlation of .41 for total years of teaching experience and use of the inductive method was significant at the .05 level. Thus, the more teaching experience a teacher has had, the more likely is he to use the inductive method. The point biserial correlation for total years of teaching experience and the use of the curriculum ( $r = .02$ ) was not significant; thus, only the aspect of the hypothesis having to do with the method was upheld.

From these results, it might be concluded that the background characteristics of age, professional preparation and teaching experience did not significantly influence the teachers' performance in terms of their use of the inductive method and social learning curriculum. Thus, Hypothesis V was not supported.

## SL and NSL Student Performance

The students of teachers using the social learning curriculum (the SL group) were compared to the students of teachers not using the social learning curriculum (the NSL group) to assess the effects of the experimental curriculum. These groupings include both E and C students since five of the E teachers and two of the C teachers were judged as using the curriculum.

### Achievement Tests.

The pre-test, post-test, and difference scores for the SL and NSL groups on the M.A.T., Lee-Clark and TOBI are shown in Table 22. Both groups made one-third to one-half year progress from pre- to post-testing on the four M.A.T. sub-tests. None of the t values for these gain scores was significant.

The SL group made one-quarter year progress on the Lee-Clark post-test, while the NSL made practically no gain. The difference between these gain scores was not significant.

On the TOBI the SL group made a mean raw score gain of about five points while the NSL group made about a seven point increase. The t value for this difference was not significant.

### Intelligence Test.

The P.P.V.T. I.Q.'s for the SL and NSL groups were practically identical from pre- to post-testing. The gain in P.P.V.T. M.A. for

Table 22

Pre-test, Post-test, and Difference Scores for M.A.T., Lee Clark, TOBI, and P.P.V.T. for SL and NSL Groups (N = 138<sup>a</sup>)

Test	SL Group (N = 42)			NSL Group (N = 96)			t on Difference Scores
	Pre-test $\bar{X}$	Post-test $\bar{X}$	Difference $\bar{X}$	Pre-test $\bar{X}$	Post-test $\bar{X}$	Difference $\bar{X}$	
M.A.T. (grade equivalent) Word Knowledge	1.52	1.98	.46	1.61	2.02	.41	.39
Word Discrimination	1.65	2.22	.58	1.58	2.11	.53	.49
Reading	1.52	1.92	.40	1.49	1.82	.33	.69
Arithmetic	1.51	1.84	.33	1.52	1.86	.34	.06
Lee Clark <sup>b</sup> (grade equivalent)	1.09	1.34	.25	1.24	1.27	.03	.93
TOBI (raw score)	17.79	23.10	5.31	17.66	24.58	6.92	1.66
P.P.V.T. (I.Q.)	74.19	74.00	.19	74.73	74.60	.13	.08
P.P.V.T. M.A. (in months)	80.48	91.12	10.64	80.33	89.28	8.85	.41

<sup>a</sup>Data were not available for 10 students.

<sup>b</sup>N for SL group = 15 and for NSL group = 36.

Table 23

Analysis of Variance of the Number of Correct Responses Made by  
SL and NSL Groups on Probability Learning Task

Source of Variation	Sum of Squares	Degrees of Freedom	Mean Square	F	P
Between Subjects	20931.302	147			
Curriculum (a)	2155.195	1	2155.195	16.758	.005
Error (1)	18776.107	146	128.603		
Within Subjects	3339.200	592			
Blocks (B)	669.265	4	167.316	37.356	.005
Interaction	54.102	4	13.526	3.020	.025
Error (2)	2615.833	584	4.479		
Total	24270.502	739			

both groups was found not to differ significantly.

### Personality Tests.

On the response set questionnaire the SL group obtained a mean of 9.10 on the last ten items while the NSL group obtained 9.27. This difference was not significantly different.

In Figure 2 the mean number of correct responses for the five blocks of the probability learning task for the SL and NSL groups are shown. The SL group had a mean of ten correct responses on Block 1. Then they made a sharp increase to twelve on Block 2. They showed a steady increase through Block 5 on which they had fourteen correct responses. The NSL group had an average of eight on Block 1. They showed a steady increase through Block 5 on which they had a mean of eleven correct responses. The SL group started at a higher level and made a quicker jump on Block 2 than the NSL group.

The difference between the SL and NSL groups was found to be significant with a Lindquist Type I analysis of variance ( $F = 16.75$ ;  $p = .005$ ). The significant interaction ( $F = 13.52$ ;  $p = .025$ ) indicates that the SL and NSL responded differently to the probability learning task as it progressed. This analysis of variance data is presented in Table 23.

### Divergent Thinking Tests.

The divergent thinking scores for the SL and NSL groups are presented in Table 24. The two Mother Hubbard test scores for the SL group were significantly greater than for the NSL group. The *t* values for two of the three Product Improvement test scores (i.e., fluency and flexibility) were statistically significant in favor of the SL group. Only the flexibility score of the SL group was significantly greater than the NSL group on the Unusual Uses Test. The SL group's mean scores on fluency, originality, and flexibility were significantly greater than the NSL group's scores. Of the eleven *t* tests conducted to compare the SL and NSL groups' divergent thinking scores, eight were found to significantly favor the SL group.

### Summary.

No significant differences were found either in achievement or intelligence tests. The probability learning task showed a significant difference in favor of the SL group for main effects and interaction. No differences on the response set were found. In divergent thinking the SL group was superior on a majority of the measures.

### I and NI Student Performance

To determine the effects of the inductive method, the students of teachers using the inductive method (the I group) were compared to the students of teachers not using the inductive method (the NI groups). These groupings include both E and C students since seven of the E teachers and one of the C teachers were judged as using the method.

Table 24  
Divergent Thinking Scores for  
SL and NSL Groups (N = 138<sup>a</sup>)

<u>Test</u>	<u>SL Group (N=42)</u>		<u>NSL Group (N=96)</u>		t
	$\bar{X}$	S.D.	$\bar{X}$	S.D.	
Mother Hubbard-fluency	3.90	2.99	2.42	2.53	3.00 <sup>b</sup>
Mother Hubbard-originality	5.55	4.40	3.42	3.60	2.98 <sup>b</sup>
Product Improvement-fluency	7.74	4.67	5.55	4.66	2.53 <sup>c</sup>
Product Improvement-originality	4.12	3.50	3.72	3.74	.58
Product Improvement-flexibility	3.33	1.80	2.51	1.75	2.51 <sup>c</sup>
Unusual Uses-fluency	6.81	4.41	5.25	4.54	1.87
Unusual Uses-originality	2.70	3.41	2.03	2.87	1.17 <sup>b</sup>
Unusual Uses-flexibility	3.79	2.72	2.65	2.22	2.58 <sup>b</sup>
Mean fluency	6.02	3.23	4.41	3.17	2.13 <sup>c</sup>
Mean originality	4.07	2.82	3.03	2.55	2.74 <sup>b</sup>
Mean flexibility	3.55	1.93	2.58	1.74	2.90 <sup>b</sup>

<sup>a</sup>Ten students not included because in two classes that were dropped.

<sup>b</sup>Significant at .01 level with two-tailed test.

<sup>c</sup>Significant at .05 level with two-tailed test.

### Achievement Tests.

In Table 25 the pre-test, post-test, and difference scores on the M.A.T. and Lee-Clark for the I and NI groups are shown. The TOBI scores were not analyzed because a measure of social learning did not seem to be related to inductive teaching. Both groups made one-third to one-half year gains from pre- to post-testing on the four M.A.T. sub-tests. There were no significant  $t$  values for any of the gain scores for the two groups.

On the Lee-Clark, the I group made one-fourth of a year gain while the NI group made no gain. The difference between their gain scores was not significant.

### Intelligence Tests.

As can be noted from Table 25, the I group made a mean gain of 1.48 in P.P.V.T. I.Q. while the NI group lost one point from pre- to post-testing. This difference was not significant. In terms of the P.P.V.T. M.A., the I group made over a thirteen month gain, whereas, the NI group made only a seven month gain. This difference was significant at the .05 level ( $t = 2.26$ ).

### Personality Tests.

On the response set questionnaire the I group obtained a mean of 8.96 correct responses and the NI group 9.36 on the last ten items. The standard deviations for the I and NI groups were 1.46 and .80. This difference was significant ( $t = 2.10$ ;  $p = .05$ ). This significant difference was due to the greater variability of the I scores.

Table 25

Pre-test, Post-test, and Difference Scores for M.A.T., Lee Clark, and P.P.V.T. for I and NI Groups (N = 138<sup>a</sup>)

Test	I Group (N = 50)				NI Group (N = 88)				t for Difference Scores				
	Pre-test $\bar{X}$	Pre-test S.D.	Post-test $\bar{X}$	Post-test S.D.	Difference $\bar{X}$	Difference S.D.	Pre-test $\bar{X}$	Pre-test S.D.		Post-test $\bar{X}$	Post-test S.D.	Difference $\bar{X}$	Difference S.D.
M.A.T. (grade equivalent)	1.56	.58	1.96	.72	.40	.32	1.59	.55	2.04	.67	.45	.44	-.79
Word Knowledge	1.60	.66	2.17	1.06	.57	.59	1.60	.61	2.14	.97	.54	.63	.36
Word Discrimination	1.49	.56	1.86	.70	.37	.40	1.50	.43	1.84	.79	.34	.60	.19
Reading	1.50	.63	1.85	.87	.35	.53	1.53	.57	1.86	.74	.33	.52	.06
Arithmetic	1.50	.63	1.85	.87	.35	.53	1.53	.57	1.86	.74	.33	.52	.06
Lee Clark <sup>b</sup> (grade equivalent)	.98 <sup>c</sup>	.66	1.20	.67	.28	.43	1.32	.55	1.35	.60	.03	.43	1.04
P.P.V.T. I.Q.	74.26	14.37	75.74	14.59	1.48	11.95	74.74	11.01	73.67	11.54	-1.07	10.45	1.25
P.P.V.T. M.A. (in months)	80.04	21.80	93.76	28.20	13.72	17.54	80.56	16.33	87.61	14.52	7.06	14.54	2.26 <sup>d</sup>

<sup>a</sup> Ten students not included because in two classes that were dropped.

<sup>b</sup> N for I group = 21 and for NI group = 30.

<sup>c</sup> Norms for this test extend below the first grade level.

<sup>d</sup> Significant at .05 level.

Practically all of the NI group obtained scores of nine or ten, while the I Ss' scores ranged from four to ten. From these results it seems that the NI students were less affected by the impossible questions than the I group.

The mean number of correct responses for the five blocks of trials on the probability learning task for the I and NI groups is shown in Figure 3. The I group had an average of nine correct responses on Block 1. They made a quick jump to eleven on Block 2 and showed a steady rise over the last three trials. They had a mean of thirteen correct responses on the last block. The NI group had an average of about nine on Block 1. They made a gradual increase over the five blocks ending on the last block with a mean of about eleven correct responses. The I group made a sharper and faster increase than the NI group over the five blocks.

A Lindquist Type I analysis of variance is shown in Table 26.

Table 26

Analysis of Variance of the Number of Correct Responses Made by I and NI Groups on Probability Learning Task

<u>Source of Variation</u>	<u>Sum of Squares</u>	<u>Degrees of Freedom</u>	<u>Mean Square</u>	<u>F</u>	<u>P</u>
<u>Between Subjects</u>	20931.302	147			
Method (A)	1863.626	1	1863.626	14.270	.005
Error (1)	19067.676	146	130.600		
<u>With Subjects</u>	3339.200	592			
Blocks (B)	696.318	4	174.079	40.009	.005
Interaction	101.961	4	25.490	5.858	.025
Error (2)	2540.921	584	4.351		
<u>Total</u>	24270.502				

The I group made significantly more correct responses to the reinforced choice than the NI group ( $F = 14.27$ ;  $p = .005$ ). The significant interaction obtained ( $F = 5.85$ ;  $p = .025$ ) indicates that the I and NI groups responded differently as the task progressed.

### Divergent Thinking Tests.

The divergent thinking scores for the I and NI groups are presented in Table 27. The I group obtained significantly higher fluency

Table 27

Divergent Thinking Scores for  
I and NI Groups (N = 138<sup>a</sup>)

<u>Test</u>	E Group (N=50)		C Group (N=88)		t
	$\bar{X}$	S.D.	$\bar{X}$	S.D.	
Mother Hubbard-fluency	4.04	3.16	2.20	2.26	3.96 <sup>b</sup>
Mother Hubbard-originality	5.80	4.58	3.08	3.21	4.08
Product Improvement-fluency	7.36	4.93	5.57	4.56	2.16 <sup>c</sup>
Product Improvement-originality	4.08	4.01	3.70	3.46	.57
Product Improvement-flexibility	3.18	1.87	2.52	1.73	2.08 <sup>c</sup>
Unusual Uses-fluency	6.96	4.49	5.02	4.44	2.45 <sup>c</sup>
Unusual Uses-originality	2.74	3.18	1.94	2.94	1.48 <sup>b</sup>
Unusual Uses-flexibility	3.72	2.69	2.58	2.18	2.71 <sup>b</sup>
Mean fluency	6.14	3.34	4.19	3.02	3.50 <sup>b</sup>
Mean originality	4.08	2.91	2.93	2.44	2.47 <sup>c</sup>
Mean flexibility	3.42	1.90	2.57	1.75	2.66 <sup>b</sup>

<sup>a</sup> Ten students not included because in two classes that were dropped.

<sup>b</sup> Significant at .01 level with two-tailed test.

<sup>c</sup> Significant at .05 level with two-tailed test.

and originality scores than the NI group on the Mother Hubbard Test. The I group's fluency and flexibility scores for both the Product Improvement and Unusual Uses tests were found to be significantly greater than those of the NI group. The originality scores for these two tests were not significantly different for the two groups. The mean fluency, originality, and flexibility scores for the three tests combined with significantly higher for the I group than for the NI group. Of the eleven t tests between the I and NI groups' divergent thinking scores, nine were statistically significant, five of these at the .01 level and six at the .05 level.

#### Summary.

In summary, no significant differences were found between the I and NI groups on achievement tests. While there were no differences in I.Q., the gains in P.P.V.T. M.A. scores were significantly higher for the I group.

In the response set the NI group had significantly more correct responses than the I group while on the probability learning task the I group was significantly higher and a significant interaction was found. On tests of divergent thinking the I group was significantly higher than the NI group on nine of the eleven comparisons.

#### SUMMARY

Chapter III presents the results of the tests of the hypotheses. These are summarized as follows:

Hypothesis I. The E teachers will use the social learning curriculum in their classrooms more extensively than will the C

teachers. This hypothesis was tested by use of a rating scale and by the subjective observations of the project consultants. The results of the rating scale showed considerable similarity between the groups except in certain elements of social learning and arithmetic. In these two areas, the E teachers were judged to use teaching materials more appropriately, to be meeting the social learning needs of their students, and to be creating independence in their students to a greater degree than were the C teachers. The observations of the consultants showed that a greater proportion of the E teachers were using the social learning curriculum more consistently and effectively. However, since less than one-half of the E teachers adopted the social learning curriculum, in the face of their special preparation this hypothesis can only be accepted with reservation.

Hypothesis II. The E teachers will use the inductive teaching method in the classroom more extensively than will the C teachers. This hypothesis was tested through the use of the rating scale, tape recordings of teacher-pupil transactions, and the subjective observations of the program consultants. The E teachers obtained significantly higher ratings on five of the 32 items of the rating scale. While the E group did not use the inductive material consistently or completely throughout the teaching day, they did use it more proportionately than the C group.

In the analysis of the tape recordings, a few differences were demonstrated. The observations of the consultants and measurement supervisor found that a majority of the E teachers and one of the C teachers applied the teaching method.

In composite, the three systems for assessing the extent to which the E teachers used the teaching method suggest that the teaching system was used to some degree but not to the extent that would permit unequivocal acceptance of the hypothesis.

Hypothesis III. There will be a significant positive correlation between the use of the curriculum and the application of the method. This hypothesis was tested by rating the teachers in both groups as to their either using or not using the curriculum. All teachers were then judged as to their application of the method. The data showed a significant correlation between those teachers who used the curriculum and generally applied the method. Thus, the hypothesis is supported.

Hypothesis IV. The E students will obtain significantly higher scores than the C students in tests of intellectual development, academic achievement, social learning, personality development, and divergent thinking. No significant differences were found in intellectual development, academic achievement or social learning. There was a significant difference in personality development in that a striving for success characterized the E group more than the C group. On tests of divergent thinking the E group was significantly superior on sub-tests of fluency and originality. In the eight other sub-tests the E group was consistently superior to the C groups, but the differences were not significant. Because the superiority of the E group was only established in a fragmentary fashion for divergent thinking and showed no differences in other areas, this hypothesis must be rejected.

Hypothesis V. Teacher background characteristics will be correlated with the use of the curriculum and method. This hypothesis was tested by correlating the vital statistics of the teacher (i.e., age, nature of preparation, experience, and years of teaching) with the frequency with which teachers were noted to apply the curriculum and method. The only significant correlation involved the total years of teaching experience and this was relatively low (.41). Thus, this hypothesis would have to be rejected.

No hypotheses were stated with respect to the effects of the inductive curriculum and method on the students. To explore these effects, teachers were grouped in accordance with whether or not they used the curriculum and method with some degree of consistency irrespective of E or C group membership. The data on the achievement, intelligence, personality, and divergent thinking tests showed that the only significant differences were found in personality and in the divergent thinking tests in favor of the inductive group and also the social learning curriculum groups. As was found for Hypothesis IV, the I and SL groups tended to strive for success more often than the NI and NSL groups on the probability learning task. The I group scored significantly lower than the NI group on the response set. No significant difference for the SL and NSL groups was found in this area. In divergent thinking, however, the I group was significantly superior on nine of the eleven sub-tests. When children were re-classified as members of the SL group, they were significantly superior to the NSL children on eight of the eleven sub-tests.

## CHAPTER IV

### DISCUSSION

This chapter presents a discussion of the data as they are responsive to the hypotheses stated earlier. The discussion of the results is within the context of a demonstration-research project, wherein it is clear that the nature of instrumentation and restrictions imposed by the terms of the study, require that strict adherence to the meanings of statistical tests of significance needs to be tempered with the respectability of the impressions of knowledgeable observers.

#### Application of Curriculum

Hypothesis I stated that the teachers in experimental classes will use the Illinois Curriculum Guide in their classrooms more extensively than the comparison teachers.

This hypothesis was tested by observer ratings of the competence of teachers to (1) group children most homogeneously for instruction, (2) establish and sustain relevant sequences for instruction in areas of learning, (3) identify and apply learning materials relevant to the areas of learning, (4) manage the procedures and substance of social learning, (5) achieve a balance between social and academic learning and (6) generate and sustain an appropriate learning atmosphere in the classroom.

The data relative to this hypothesis showed a limited number of significant differences between experimental and comparison

teachers. These, however, were in the direction of support for the hypothesis. The limited positive differences suggest the influence of the curriculum and teaching system, and of the type of consultant help provided by project staff. Of the 30 areas of observation of teachers' use of the curriculum, the experimental teachers were rated higher in 22 (73%). Of these, the experimental teachers were significantly higher in their abilities to use arithmetic materials, and to generate a positive learning atmosphere in arithmetic. In addition, they were significantly superior in assessing the social learning needs of their children and in developing teaching procedures to respond to these needs.

#### Differences in Instruction

Credit for the differences in arithmetic instruction may be attributed to the project consultants who developed and oriented the teachers to a specially prepared arithmetic teaching sequence in which the subject matter was organized and where teaching procedures were provided in this area. A similar program was developed in language arts. In contrast, however, it was less detailed and therefore had less influence upon the teachers' activities. Even so, it is worth noting that the major areas of superiority of the comparison classes were in writing and spelling. In all of the conceptual areas of language arts, the trend was consistently in favor of the experimental classes.

The significant differences and the trend in social learning areas favoring the experimental teachers are important because they represent the most obvious reversal in teaching procedures in

this project. At the beginning of the study, the observations of the consultants indicated that the one area that was most obvious by its absence from the classroom was a systematic social learning program. In many classes, the day was taken up with the teaching of academic subjects. In a few cases, teachers were dealing with current events and National holidays under the guise of traditional social studies in an attempt to respond to the social maturational needs of their pupils in accordance with their best speculation of what these needs were and how they should be met.

The training year was devoted, in great part, to getting the teachers to reconceptualize the focus of the special class and to become familiar with the nature and implementation of the curriculum. During the term of the study, the consultants worked closely with the teachers to sustain the momentum achieved during the training year by helping them assess the social abilities of their students as a foundation for decision making about the social learning relevant to their classes.

Thus, it may be said, with some reservation, that the experimental teachers tended to respond to the guidance provided through the curriculum although, as will be seen from data discussed later, there was considerable room for improvement. The observations by consultants support the rating scales in this respect and emphasize the importance of trends in the scale.

#### Teaching Method

Hypothesis II states that the experimental teachers will use the inductive teaching method in their classrooms more extensively than the comparison teachers.

Data to test this hypothesis were provided through an observer's rating scales and by way of tape recordings of teacher pupil transactions.

Teachers were rated on a five point scale in each subject matter area (academic and non-academic) on management of the classroom, appropriateness of use of the method, use of cues and reinforcement, teacher responses to incorrect answers, and ability to close out transactions by having the students effect generalization and summarize the transaction. In each case, the ratings ranged from rote teaching at one extreme to consistent inductive teaching at the other. A mid-score of 3 was indicative of a mixture of the two in the form of vacillation from one teaching method to the other even in the course of a single transaction.

The data show that both the experimental and comparison teachers tended to be eclectic in their choice of teaching method. The trends suggest, however, that the E teachers were closer to consistency in inductive teaching in most areas that were ratable (75%). They were significantly superior in inductively teaching the social learning subject matter, in providing learning cues most consonant with the experiences of their students, and in their awareness of the need to respond to incorrect answers of students by re-phrasing the question rather than supplying the correct answer.

At the same time, the data show that the E teacher tended to limit their application of this method and to fall back on the more expeditious methods by providing evaluation of student responses

and by restructuring their responses for them instead of giving the responsibility to the student. This is consistent with their tendency to stop short of getting the most out of the transaction by omitting an opportunity for the students to elicit a generalization (where this was possible) or to summarize what has been learned. The habits of rote teaching encroached sufficiently in teaching transactions in E classes to vitiate any differences despite the trends in favor of the E teachers.

Analysis of tape recordings corroborate the observers' data insofar as the tendency of the C teachers to apply a rote system for teaching was concerned. The C teachers asked significantly more memory questions in all academic areas combined but particularly so in arithmetic. Not unexpectedly, their students gave significantly more rote memory responses and were more often correct in their responses. Thus, the C teachers stressed the memorization of facts as opposed to learning concepts, and in return got from their students a correct statement of the fact. This may help to account for a tendency on the part of the children in C classes to be superior to the E children in spelling and writing.

In combining the results of the rating scale and the analysis of tape recordings, one may conclude that the E teachers tended to teach inductively, but with limited appropriateness and effectiveness. Nevertheless, their effectiveness, where significant, was in areas pertinent to the hypothesis. Similarly, where comparison teachers differed significantly from experimental teachers, it was in areas

that support the hypothesis. That is, they were significantly more rote in their management of learning. On a nose count basis and without any qualitative implications, observers report that where the inductive method was used at all, it was used in the E classes.

#### Changes in Competence

Implicit in the foregoing is the factor of change. All of the data are based on the assumption that E and C teachers were similar in their competence to structure curriculum and differentiate method at the beginning of the study. While project staff, the teachers, and administrators find in the data confirmation of their impressions that change in the direction of enhanced teacher competence did take place, these would have been more convincing with pre and post evaluation data relative to change.

The nature of this demonstration-research project did not permit pretesting for many reasons. Firstly, in the planning stage, it was impossible to specify the particulars of evaluation beyond molar kinds of behavior. Secondly, the logistical problems in obtaining samples and training the E teachers did not permit for development and/or modification of new or available instruments.

Instead, the two consultants on the project staff were asked to keep logs of their visits and, among other observations, to note signs of teacher change and their nature. They did so by evaluating teachers according to specific teaching attributes and in their relationship with the consultants at the conclusion of each visit.

It is worth noting that classroom management problems were clearly of significance from the time that candidates for the study

were first approached. The large majority of teachers who could have participated stated that they were too preoccupied with classroom management problems to take on another task. It is highly likely that those who did volunteer felt that they had these problems solved well enough to branch out into activities that might contribute to more effective teaching. While the experimental teachers were relatively competent in classroom management as compared with their pedagogic abilities, the combined anecdotal notes and ratings show that the majority were able to steadily increase the amount of teaching time and effectiveness as their management problems decreased.

Change was a persisting factor during the two years of the study and this is borne out in the tabular data. Nevertheless, while change was entirely in the desired direction, there was room for much more in almost every area of curriculum application and teaching method. Whereas most of the teachers were rated as mediocre or less than mediocre in their total performance at the beginning of the study, only one-third were so rated at the end. Even so, the teachers continued to look to the consultants for guidance and help despite their observed competence. This suggests that teachers may feel insecure when anything as abstract as a teaching method (or a socially oriented curriculum) is attempted without immediate feedback as to teacher effectiveness. With the consultants available to give such reinforcement, enough security was provided for the teacher to move forward in the development of pedagogic skills.

In defense of the teacher, it is worth noting that a rote system of teaching does allow for most immediate feedback in the form of student response. A teacher knows immediately that he is getting a correct or incorrect response. In teaching conceptually, however, the teacher knows very well that he cannot rely on the utterances of his students as being the best evidence of "knowing". He needs to wait for the independent behavior in problem solving, for example, that shows that the concept has been learned. This type of behavior may take awhile to emerge.

The investigators did not anticipate the difficulty teachers would have in implementing and reconciling a complex teaching method, probably because they are most familiar with the accomplishments of teachers emerging from an undergraduate teacher preparation program where early introduction to the teaching method, and continuing demonstration and practice are experienced prior to teacher certification. In contrast, the experimental teachers, many of whom had prior preparation and experience in regular classes, were given on-the-job training in the form of more or less traditional in-service training. Clearly, this is not as effective as would be desired.

An almost identical picture is seen in the before and after ratings on use of the curriculum and in the degree of independence achieved. The relative insecurity of the teachers in this case, however, was due to the wide variety of curricular choices to be made in determining what aspect of social learning was most

appropriate for their classes. These were "typical" classes for the EMR: that is, considerably heterogeneous in C.A., M.A., and social sophistication. Therefore, the selection of the most relevant ten life functions in the Illinois Guide was dependent upon the rampant cues, found within these classes. Rarely was one outstanding; more often, two or three and sometimes four clamored for attention. It was at this point that the consultants played a most important role. They brought to the decision making task an additional observation along with a greater degree of objectivity than the teacher.

As one considers the problems of the teacher in making decisions about innovations in teaching method and curriculum, it becomes clear that all teachers, to some degree are going to need help. Administrators assume that the training of the special class teacher makes him a specialist who can operate independently of the usual guidance resources available to teachers. Administrators and supervisors who urge their teachers in the direction of complete independence may be doing so at the expense of productive teaching and learning. What is probably needed is the most positive amalgam of independence and dependence as indicated by the educational program, the nature of the teacher, and the constituency of the classroom at any given time.

#### Receptivity to Consulting Help

Within the framework of the consultants activities, it was noted that about 25% of the teachers were less than moderately receptive to the consultants' help at the beginning of the study. This could be due to: (1) unsatisfying past experiences with super-

visors or (2) administrative pressure put on some of the teachers to take part in the study or (3) lack of certainty of the consultants' competencies.

In any case, as the contribution and demeanor of the consultants became clear to the teachers, there was a strong trend toward accepting the help of the consultants and cooperating with them. The number of visits by consultants in the two years of the study far exceeded anything by way of help that the teachers had received previously. In addition, the consultants were able to communicate to the teachers that they were there to help them and not to over-see. Thus, teachers felt that for the first time there was constructive communication between classes.

The nature of the contribution of the consultants, along with their frequent visits, not only won over half of the skeptics but also increased the receptivity of those who were on the fence and luke-warm. By the end of the study, almost half of the teachers were fully receptive of the consultant's contribution.

All of the foregoing suggests that teachers approach consultive help, usually referred to as supervisory, with some reservations. In some cases, this may be due to their pessimism about an annual or semi-annual visit by someone they know only officially. In other cases, it may be due to the teachers' reticence to expose themselves to criticism because of their own feelings of inadequacy. It is highly likely that some teachers reject the consultant because they feel that they already know more about their craft than the consultant and that he is only wasting their time. There is more

than a grain of truth in each possibility. It remains for the consultant to be competent and visible enough to reduce the unreal instances to a minimum.

At this point, the discussion of the results represents a combining, of the data relative to Hypothesis I and II, and the results of the teacher change rating scale. The statistical results and judgements of the consultants seem to warrant the conclusion that, as compared with the C teachers, a sizeable proportion of the E teachers used the Illinois Guide; therefore, Hypothesis I can be accepted with reservations. Many of the E teachers who were not using the curriculum at the beginning of the study were applying parts of it. This can be attributed to the training program and the contribution of the consultants. While Hypothesis II can be accepted similarly, a proportion of the E teachers were applying the teaching method at the end of the study which, likewise, may be attributed to the training and the contribution of the consultants.

This raises the question of why less than half of the E teachers were able to achieve satisfactory ratings in the use of the curriculum and teaching methods. To answer this question we need to evaluate the data connected with Hypothesis I and II.

#### Training

It will be recalled that the E teachers received two semesters of training prior to the two years study. This was conducted within the tradition of in-service training. That is, there were weekly after-school lectures and some on-the-scene

demonstrations. The investigators agree that this style for modifying the behavior of teachers is seriously limited, particularly in the dynamic areas of pedagogy and classroom management. The setting is so artificial and distant from the realities of children and subject matter confrontations that transfer is almost impossible to achieve. Clinical psychology has been aware of the limitations of this means for behavior modification for a long time. Education, however, is not. We still attempt to tell teachers how to behave under stress, and in situations where split-second decisions need to be made. Obviously, if teachers are, for any reason, unconvinced or unsure about recommendations for action contained in lectures, they will, under stress, fall back on their best interpretation of "what has worked before" with the hope that the past experienced are relevant to the present situation. This is a rational behavior in light of the penalties for losing control of the transaction.

It is important to recognize that all of the E teachers could describe in detail the nature of the curriculum and the precepts for using the inductive teaching method. If the evaluation of the in-service training was limited to a final examination, all of the E teachers would have received high marks. The test, however, is in the classroom and here relatively few were able to display the outcomes of in-service training. Even then, they needed the help and guidance of the consultants to attain visible competence.

Management Problems:

There were a few cases where something other than confusion

stood in the way of the teachers. This was in a few classes where the behavior problems of the children militated against any consistent pedagogy. In these classes, the need to indoctrinate the children toward the kinds of behaviors consonant with learning of school substance transcended the intent of the teacher to use the curriculum. Teaching, in the professional sense, was necessarily sporadic and therefore lacked the impact and increments that derive from continuity. This tended to neutralize the data on the productivity of teachers who applied the curriculum and method well.

Unwillingness of Teachers to Change.

Beyond those teachers who were unable to change, some of the teachers not using the curriculum and method well enough to be so rated were clearly unwilling to change their ways of doing things. These teachers were, by any reasonable standards, relatively ineffective. They were eclectic in their choice of subject matter for their classes and remarkable rote in their teaching. Many put on a facade of compliance toward the theme of the study and the recommendations of the consultants. They expressed good will and discussed intelligently what needed to be done, but once transactions began, they reverted or they somehow never got "planned and agreed upon activities" started.

It is difficult to tell whether the unwillingness of these teachers to get to the heart of the study was due to poor preparation for the work or to some kind of personality factor, or both. In any case, their performance tended to neutralize the effects of the more cooperative teachers.

### Negative attitudes.

The consultants' logs and the observations of the raters indicate that a number of teachers established implicit levels of performance for their students through their low estimation of the abilities of retarded children. There were those who implied that mentally retarded children couldn't learn to think critically and act independently. They felt that these children can reach a respectable level of performance if they are thoroughly coached (conditioned) in the desired behavior. These teachers reflected their negative attitude in the fact that their teaching style was predominantly rote.

The consultants attempted to modify these attitudes in many ways, e.g. through discussion: by way of demonstration, and by having these teachers observe the methods of more optimistic teachers. They are not, however, sanguine about the effects of these as attitude modifiers.

### Correlation of Curriculum and Method

Hypothesis III stated that there would be a significant positive correlation between the use of the curriculum and the application of the method.

To test this hypothesis, all of the teachers (E and C) were grouped as using the inductive teaching method within the context of the socially oriented curriculum. This approach would be consonant with the expectations for academic and intellectual change in a study spanning two years involving retarded children ranging in chronological age from 6 to 12. This will be discussed later.

At the time that the hypothesis was stated, the investigators were well aware of the improbability of demonstrating significant changes in I.Q. because of the prior experiences of Kirk (1958), Goldstein, Moss and Jordan (1965), and Stroud and Smith (1960). Similarly, it became obvious in the course of the study that the test designated to assess social growth is best suited to younger children, in that it focuses more on factual social knowledge than on the concepts contained in the socially oriented curriculum, Moss (1962).

Considering the factors militating against dependable differences in a relatively short-term study, it seems that the only real remedy would be intensive, appropriate teaching. As already stated, less than half of the E teachers taught appropriately. As far as intensive teaching was concerned, Minskoff (1967), in her investigation of the nature of teacher-pupil transactions in the present study found that on the average teachers devoted 30% of the teaching day to the rituals leading up to and including lunch, to "cleaning up", and to the non-academic areas such as arts and crafts.

The foregoing help to account for the clear lack of differences in the areas tested. Only in achievement was there a significant difference in favor of the E group. This was in the Metropolitan Achievement subtest Word Discrimination. This finding is difficult to explain in light of the lack of differences in other areas of language arts. (The most parsimonious explanation would suggest that the significant "t" is a function of the probability

operating when one performs a multitude of "t" tests.) Similarly, there are spotty differences in personality development and divergent thinking for which it is difficult to account.

Rather than discuss these within the traditional E vs. C group clusters, it would be more important to the outcomes of this study if the data reflected the intended groupings; namely, children in classes where the social learning curriculum and inductive method were employed as compared with children in classes where curriculum is more eclectic and where the teaching system is less inductive.

In the course of the study, 5 of the 17 E teachers achieved high ratings in use of the curriculum and method. The reports of observers indicated that 2 of the 7 C teachers were so rated. Thus the children in these 7 classes (hereafter designated as SL classes) were compared with those in the 17 classes not applying the curriculum and method (NSL classes). The N's were 42 and 96 respectively.

As stated in Chapter III no differences were found between the children in these classes in intellectual development or achievement. In personality development, however, the predicted outcomes were reversed. In the probability learning task, where it was anticipated that the SL group would strive less for success, the opposite was found.

The prediction that the children in the SL classes would be less in pursuit of success was based on the results obtained in the study by Goldstein, Moss and Jordan (1965) which showed that

children in the E classes were exposed to less opportunities for failure than those in the C group. The C children, for example, were studying from readers which were above their measure of reading levels. The E children's readers were more consonant with their abilities.

Why then were the results in this aspect of the study opposite to those predicted? Firstly, unlike the children in the Goldstein, Moss and Jordan study, it is not unlikely that the children in the SL classes were being made to do what was required of their teachers; namely, to give up seemingly secure and familiar ways of doing things in favor of what initially appears to be a less structured procedure, and one with delays in reinforcement. It should be kept in mind that the children in NSL settings get wrong answers corrected for them almost immediately after their response is made. Furthermore, reinforcement is almost unilaterally provided by the teacher. Thus, the child more often than not has a good idea of how he stands with respect to his role as a student. Likewise, he has a clear view of the role of the teacher.

The children in the SL classes suddenly, and after many years of seeming security, had old familiar ways changed for them almost overnight by their teachers. Now they were asked to examine their own responses, to ascertain the consonance of the response with the question. They were asked to process data and, at the same time, to learn a style for processing that would more often than not culminate in reaching a satisfactory answer. But they were not given the answer

nor were they given overt reinforcement for the answer itself until the teacher satisfied that they had processed the data properly.

It is likely that the two years of the study brought these children into teacher-pupil transactions more dynamically and profitable (as will be seen later), while increasing their feelings of insecurity and anxiety. It is also likely that the results achieved in the Goldstein, Moss and Jordan study would have been achieved in this study if the SL children were measured at the end of four years instead of two, or if they had started in special classes in which an inductive method of teaching was used at the outset of their school careers. As it appears, they were caught in a period of transition from a more nearly rote method of learning to one predominantly inductive; a period in which they had to think critically and act independently. This could lead to perceptions of failure and feelings of frustration. That this is not as debilitating as it might seem to the children is seen in the fact that they did not suffer in intellectual and academic achievement during this period.

The more obvious effects of the SL environment are found in the tests measuring children's ability to think divergently. Here the predictions were born out. Of the three areas studied, (the Mother Hubbard Test, the Product Improvement Test, and the Unusual Uses Test), the SL children were significantly superior in 8 of the 11 measures. They were, on the average, significantly superior in fluency, originality, and flexibility.

These tests reflect the goals of the inductive method, namely to so arrange the teaching environment and teacher-pupil transaction that the child can play an active role in problem solving. Practice is given in differentiating relevant from irrelevant cues and in effecting associations of facts and concept that will lead to inferences, predictions, and generalizations made by the child and evaluated by the child and teacher in combination. The tests of divergent thinking present the child with problem solving tasks which tap the abilities developed by an inductive system of teaching which, in turn, is most consonant with the substance of a socially oriented curriculum. This is the case with tests of intelligence and of academic achievement.

One could conclude from the foregoing that the combination of a socially oriented curriculum and inductive teaching method contribute in part to children's abilities to think critically and independently. Clearly, tests of intelligence and academic achievement do not reflect these abilities to the extent that tests of divergent thinking do.

Hypothesis IV stated that teacher background characteristics would be correlated with the teacher's use of the curriculum and method. The usual data were collected to test this hypothesis. Correlations were made between effectiveness and age, professional preparation, experience with the retarded children, experience with normal children, variety of teaching experiences and total years of teaching. The only significant correlation, albeit low, was found between use of the method and total years of teaching experience.

The data bear out the observations of the consultants who found that teachers who had solved most of their classroom management problems were most able to attend to the changes required of them in the implementation of a "different" curriculum and teaching method. Logically, it takes time to acquire the techniques of classroom control. The fact that the correlation was relatively low (.41) suggests that some teachers take less time than others, and that there were some of the "less" experienced by years teachers in this group.

### Conclusions

Despite the complexity of this study and even in the face of the many pockets of inconclusive data, there are certain bits of information that, in the opinion of the investigators, merit further consideration. These, it is felt, have implementations beyond what the results herein indicate.

In perusing the conclusions, the reader needs to keep the limitations of this study in mind so that perspective is maintained. For this reason, the caveats discussed earlier are repeated here.

In designing the present study, it was recognized that the nature of the investigation, the criteria for sampling, and the means for evaluation placed serious limitations on the "scientific" stature of the study as a whole. One needs to recognize that the "catch-as-catch-can" conditions for such a study -- the fact that the teacher, substance, and system have, at best, only face validity; the fact that teachers in the "experimental" classes were volunteers, and that their students were concomitants of the teachers' volunteering; the fact that available descriptions of children thus captured were random in nature and vague in detail; the fact that modes for observing what occurs in a pedagogic setting are still crude; and the fact that measurement devices lack the level of efficiency required for this type of study.

Due to these conditions, it is necessary that a conservative approach be employed. Thus, the concept of control, as it is usually applied in objective investigations, needs to be limited to comparison - both in fact and in action.

It should be kept in mind that the spirit of this demonstration research project was to show that teachers who apply a socially oriented curriculum using an inductive teaching style will achieve results consistent with the needs of retardates at maturity. Apart from the achievement data, the intent of the project, even within the limits imposed by uncontrollables, was met. It will be recalled that children in classes where the socially oriented curriculum and the inductive method were employed appropriately were significantly superior in personality and cognitive characteristics consonant with critical thinking and independent behavior. It could be assumed that even though these children did not outstrip their peers in "traditional" settings in academic achievement, they would employ academic skills as problem-solving tools more creatively and surely. This statement is an extension of the data that bears further study, in that it would put academic learning into a more appropriate perspective which was not the case in this demonstration project.

It is also worth noting the results of the data relevant to the interactions of consultants with teachers. Most interesting was the reversal of the teacher's attitudes toward the consultants wherein a sizeable number who rejected (overtly and covertly) the help of the consultants became accepting and cooperative. This can be accounted for by the fact that the consultants brought to the classroom more than sincere interest and a sympathetic ear. In addition, they presented the teachers with concrete teaching suggestions and materials. They developed

systematic means for evaluating the status of the class with respect to the aspect of the curriculum most relevant to the needs of the class. They conducted workshops so that teachers could display and demonstrate teaching techniques and aids. Above all, they developed and presented to the teachers sound and thorough systems for teaching arithmetic and language arts. These were in the form of teaching guides and were very detailed. In addition, they were responsive to teacher's calls for help and responded without reservation. This project suggests strongly the role of the consultant and how it should be fulfilled.

It is most important to note that the cohesive role played by the consultants in this project was not anticipated in the original plan. The discrepancies in communication and leadership between experimentors and teachers that emerged required that the consultants enrich their transactions with teachers. Instead of serving in the usual supervisory role, our consultants had to make literal translations of the training program into classroom actions. To do this, they planned and activated demonstrations and workshops. Beyond this, they developed thorough teaching sequences in language arts and arithmetic.

The gaps in communication between the project staff and the teachers were analogous to those between local administration and teachers. The remedies imposed by the consultants were therefore analogous to those required of traditional supervisory staff. It would be most important, then, in planning research and/or demonstration in special classes that the role of consultant or supervisor be as full and contributory as conditions demand. The gaps in teacher competence, in teaching facilities, and in classroom procedures need to be examined prior to the study and accomodated from the beginning.

This project does not answer a pervasive question; namely, what are the teacher variables that differentiate those who accept direction, who are amenable to change, who are willing to work toward positive change from those who cannot or will not change? Certainly, the usual teacher data do not differentiate these types. Until we learn what factors are operating, teacher preparation, in-service training, supervision, and teacher workshops will remain random in their results. When we can predict what kind of teacher profits best from what kind of improvement design, we will be able to employ appropriate measures profitably.

While the results of this project are positive in a modest sense, its greatest contribution, from the viewpoint of the investigators, is in the direction of its implications for further study. Beyond the work that is needed to develop and improve existing measurement techniques and devices for use with retarded children, we need to turn our attention to the specification of a program of substantive education for these children and youth, and to test it rigorously so as to ascertain both validity and reliability.

Further, we need to study the relationship between the substantive elements of an educational program and the systems by which these elements are managed in teaching transactions. This project shows that there is a dynamic relationship between the two. The implications of certain child and teacher variables to this relationship need to be studied so that teachers may employ them most effectively.

Modification of teacher behavior needs further investigation. It was found in this study that in-service training by the lecture method has limited and specific increments. It increases teachers knowledge far more

than it affects teaching behavior. The nature of in-service training, as a device to effect positive change, needs further study.

The role of the consultant-supervisor needs further review. In appointing a supervisor, the need for a consonance between teacher's expectation of someone occupying this role and what he is able to deliver must be considered. The results of this project suggest that teachers have learned to approach/avoid a supervisor with some cynicism and reservation. We need to examine how these attitudes evolved and what it will take to change them.

Finally, we need to re-assess the relevance of research designs for classroom and other institutional studies. Obviously, the biological model confuses more than it clarifies. One should not have to devote so much time and energy to qualifying results because of design insufficiencies and confusions. There are implications here for both research methodology and for the training of researchers.

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## APPENDIX A

### Description of the Inductive Teaching Method\*

The primary goal for the education of the mentally retarded child is to prepare him "to think critically and independently to the best of his ability." The social learning curriculum is related to critical thinking in that it provides the retarded child with the basic data (i.e., facts, concepts, skills, etc.) employable in evaluating his environment. The inductive teaching method is related to independent thinking in that it encourages the retarded pupil to use the basic data provided by the curriculum to make decisions independent of external guidance.

The inductive or experimental teaching method (the E method) contrasts with other methods that might be used in special classes (control or C methods) as follows:

1. The nature of the learning situation as reflected in teacher questions. The E teacher seeks to develop the retarded child's ability to think independently by placing pre-eminence on the development of problem solving ability. This method calls for the child's use of inductive reasoning to arrive at a solution to a problem (hence, the label "inductive method). Therefore, the E teacher poses a problem situation and asks questions requiring the student to use reasoning to arrive at a solution to the problem.

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\*Adapted from: E. H. Minskoff, "Verbal Interactions of Teachers and Mentally Retarded Pupils" . . . unpublished Doctoral Thesis, Yeshiva University, 1966.

The C teacher is concerned with fact dispensing and rote learning. Thus, her questions require the use of memory or simple cognition. This serves to encourage the retarded child's dependence on others to solve his problems.

2. Selection of cues to structure the learning situation and to elicit pupil responses. The E teacher's goal is to structure the learning situation so that the pupil can see the cues relevant to solving the problem, make the appropriate association of the present cues with already learning facts, and then either develop a hypothesis that will enhance the probability of arriving at an appropriate solution to the problem or goes directly to the solution. The E teacher's selection of cues is based on her diagnosis of the child's fund of knowledge in each ability area. Thus, the cues provided are relevant to the problem and appropriate the child's developmental level.

The C teacher does not create problem solving situations, and thus may not be concerned with the selection of relevant cues. If she does attend to the cues provided, it is probable she does not select them in relation to the child's developmental level. Thus, the cues provided by the C teacher may be neither relevant nor appropriate.

3. The nature of teacher feedback to student performance. With the E method the (1) child's correct responses are immediately reinforced. After the child has (2) incorrectly responded, the

teacher gives negative reinforcement and/or signals the child to evaluate his response and then re-respond. The E teacher does not prompt the child nor does she supply the correct answer. If the child persists in giving the incorrect response, the E teacher evaluates the situation to determine whether the appropriate response has been built into the child's response repertoire in sufficient strength to be elicited or whether the cues are appropriate. Then the E teacher (3) re-structures the learning situation accordingly. Hence, the teacher is teaching and testing simultaneously.

By using this approach, the E teacher is building into the retarded child mediating behavior which encompasses the following learnings. (a) The child learns to assess the results of his action by observing its impact on others. (b) He learns that it is appropriate to re-read the cues provided by the teacher as they relate to his response. (c) He acquires a feeling of independence from the realization that through his own efforts he can solve a problem.

After a student's correct response, the C teacher provides positive reinforcement; therefore, the E. and C teachers do not differ with respect to correct student performance. However, one of the most critical differences between the E and C teachers is their feedback to incorrect student responses. The C teacher does not ask the child to evaluate his wrong response nor does she ask him to re-respond. Often she provides the correct response. Thus, the teacher acts as the sole judge of right and wrong, and builds the

dependence of the retarded child.

4. Consistency of teaching methods. The E method is used consistently from one subject matter to another. Because it underlies as many teacher-pupil interactions as possible, it pervades the non-academic as well as academic areas of instruction. The C methods are usually eclectic and sketchy. They are generally related to objects, teaching aids, guides accompanying texts, etc. Thus, there is much variation from one subject matter to another; and this variation is most marked between the academic and non-academic subjects.

In Fig. 1 the methods are contrasted diagrammatically so as to highlight their differences. The methods differ in: (1) the types of questions asked by the teachers; (2) the types of cues provided by the teachers; (3) the processes used by the students to answer the teachers' questions; (4) the teachers' feedback to incorrect student performance; and (5) the amount of responses made by the students.

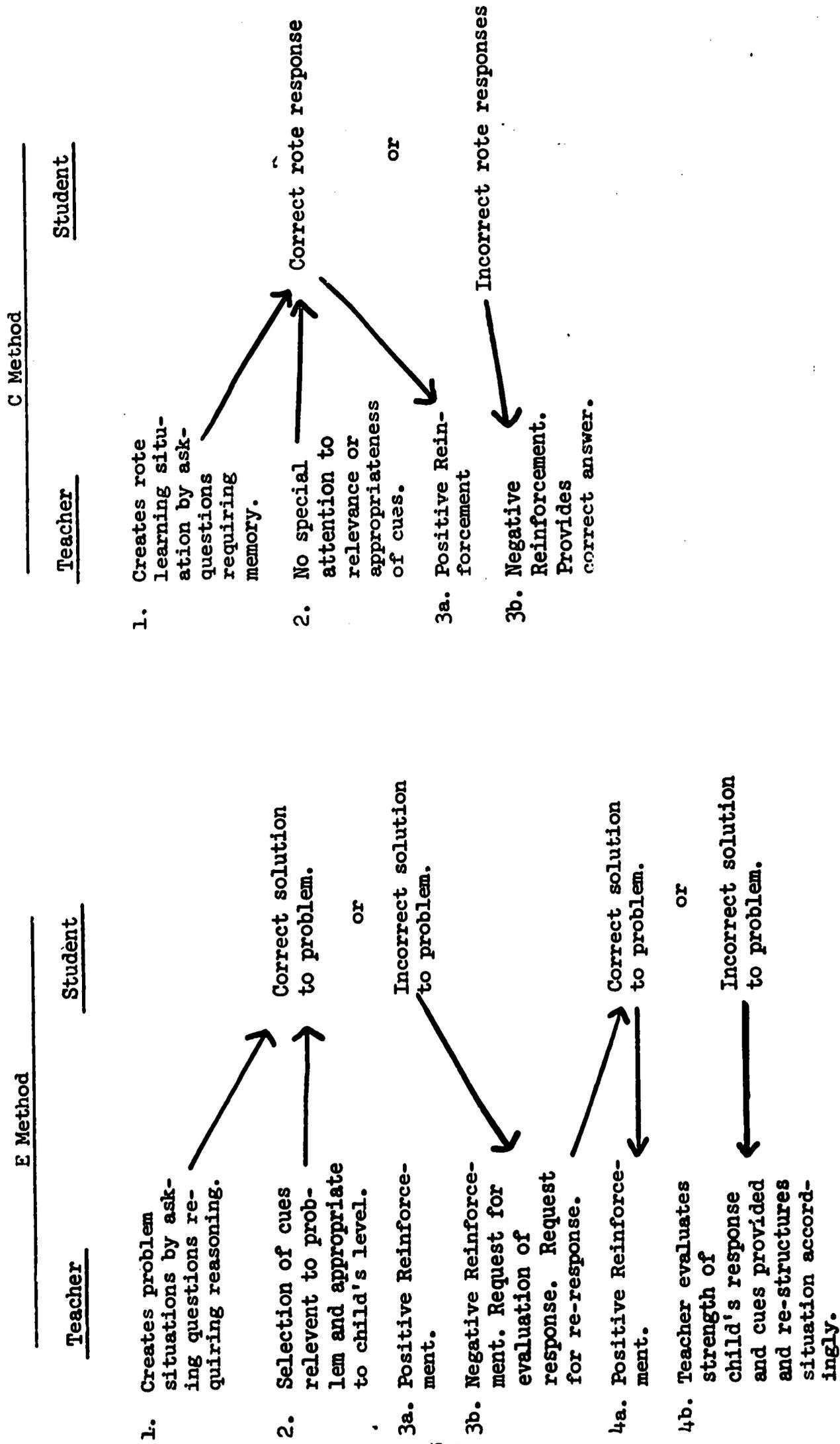
If another dimension could be added to Fig. 1, it would show that the E method is used consistently in all subject matter areas, while this is not true for the C methods.

From this comparison of the E and C methods, Goldstein's contention that the inductive method develops independent thinking while the other methods do not seem well-founded.

Wallen and Travers (1963) state that "an unreasonable

assumption is made that, because a teaching method has been described, corresponding patterns of behavior can be, or are, manifested by teachers" (p. 467). Medley and Mitzel (1963) propose that teaching methods can only be differentiated by direct observation in the classroom. Hence, an objective of this study was to make explicit the actual teaching behaviors of the teachers supposedly using the E method and those using the C methods, and to determine whether these were congruent with Goldstein's descriptions of these methods.

Figure 1  
Comparison of the E and C Teaching Methods



## APPENDIX B

### Description of the Teacher In-Service Preparation Program

#### Teacher Preparation

The divergent professional preparation and special education experience of the experimental teachers indicated a wide range of understanding and practices related to curriculum and methods for the retarded. Therefore, the underlying rationale of the teacher training course and/or workshops was to compensate for inter-teacher variability by creating a uniform frame of reference concerning the theoretical and practical aspects of the teaching method, social learning curriculum, and the skill areas of arithmetic and language arts.

The topic outline reflects the didactic and experiential content of the preparation course. Following each lecture and demonstration, the teachers received a detailed summary of each session entitled "training course minutes" as recorded by a teacher secretary. Below is an outline of the topics in the preparation course:

#### Topic

##### A. Overview of Project:

1. Discussion of the project's objectives and operational procedures.
2. Elaboration of the teaching method as related to the child's psychological repertoire and appropriate evocative teacher behaviors.
3. Discussion of the significance of critical thinking and independent problem-solving for the educable retardate.

B. Arithmetic:

1. Presentation of the arithmetic-processes model and definition of arithmetic terms.
2. Development of the concepts in the arithmetic-processes model (see Figure 2.)
  - a. Readiness
  - b. Rote and rational counting
  - c. Number recognition, writing and sequence
  - d. Sample grouping
  - e. Place value
  - f. Addition and subtraction
  - g. Multiplication and division
  - h. Problem solving
3. Demonstration of arithmetic materials, teaching aids, textbooks, and worksheets.

C. Language Arts

1. Presentation of the learning theory based on mass, differentiation, and integration as the basic language arts model of instruction.
2. Introduction of methods to develop:
  - a. Word recognition
  - b. Basic sight vocabulary development
  - c. Phonetic word attack skills
  - d. Identification of the five stages of reading comprehension, i.e., labels, details, inferences, predictions, and generalizations.
3. Utilization of student experiences as the basis for listening, speaking, reading, and writing activities.
4. Demonstration of reading materials, commercial reproduction materials, textbooks, and workbooks.

D. Social Studies

1. Development and elaboration of the expanding environment model as related to "life problem" approach of the Illinois Plan.
2. Introduction of the physical, social and psychological aspects of social interaction as related to the model.
3. Utilization of audio-visual aids.
4. Correlation of social learning and subject matter areas.

5. Development and utilization of social studies units.
6. Summary of classroom applications of the reading method within the context of the social learning curriculum.

#### Voluntary Workshops on Instructional Materials

As a result of limited time and amount of teaching materials displayed during the initial training course, three subsequent teacher workshops were organized. The primary purposes of the workshops were:

1. To demonstrate the applicability of the training course principles, concepts and methods to the physical and instruction context of "typical" project classrooms;
2. To encourage the participation of experienced project teachers as contributors to the training program;
3. To provide an exchange of ideas, materials, procedures, and methods between teachers of similar class groupings, i.e., by chronological ages and/or levels of functioning;
4. To investigate the ways and means of adapting commercial books and materials to fit the variability of student performance; and
5. To culminate the training with pragmatic examples of the applicability of curriculum and method to the educable retarded student.

The format for each workshop was identical. The four host teachers conducted tours of their classrooms; demonstrated successful materials, techniques, and practices; and conducted an informal question and answer session. Finally, the assistant project director summarized the proceedings and related the materials and methods to aspects of the experimental curriculum and/or method. While the host teacher and assistant project director had pre-selected the general type of materials to be demonstrated, the program was flexible enough to suit the needs and interest levels of the teachers in attendance.

1. Workshop for classes of so-called "brain injured" educable students.

This workshop was based on the assumption that a teacher can develop an instructional program for young educable children with marked perceptual, verbal, and/or social deficiencies through the use of a tutorial approach and modification of commercial materials. The workshop included the following content:

- a. Demonstrations of the adaptation of commercial and/or teacher-made materials to each child's level of functioning.
- b. A study of the sequential presentation of instruction by way of concrete teaching aids.
- c. An analysis of procedures for assisting hyperactive distractible children into the behavioral patterns demanded by a classroom setting.
- d. A structured classroom program consisting of academic and social skills.
- e. An analysis of relevant instructional materials at a readiness level of performance.
- f. Group assessment of materials unique to the so-called "brain injured" educable mentally retarded and those materials suited for all types of educable children.
- g. Host teacher's description of total special education program of her school district and unique functions of her class to prepare children in transition from regular to special classes.
- h. Group discussion of the advantages and disadvantages of a tutorial approach.

2. Workshop for classes containing both primary and intermediate level educable students (C.A. range 8-13).

This workshop was held on the assumption that classes composed of both primary and intermediate level children can

be organized and instructed to solve social and/or academic problems in an independent fashion.

The following content was provided:

- a. A demonstration of organizational and procedural methods for evolving a classroom program based on the social learning curriculum through (1) selection of yearly theme, (2) designation of related units based upon life problems, (3) methods of initiating program and maintaining continuity throughout year, (4) development of student committees and organizational structure, (5) matching student competency to student responsibilities, (6) development of student leadership roles, (7) enlistment of parental support, (8) correlation of academic subjects in problem-solving situations, and (9) other related topics.
  - b. An exploration and discussion of methods of introducing the inductive teaching method in a classroom with C.A. and M.A. range including the use of the method in academic and non-academic areas, employment of students as tutors and/or group discussion leaders, and enhancement of experiential and verbal abilities for discussions.
  - c. A presentation of facilities and activities that enhance student independence as foreman and workers on group academic and/or crafts projects, organization of resource materials for independent use, role of class members in initiating new students into class routine, and development of proper attitudes toward independence and personal responsibilities.
  - d. An analysis of methods of using teacher-made materials to supplement commercial textbooks.
3. Workshop for two adjacent classes for primary or intermediate educable students.

This workshop was based on the assumption that through the pooling of commercial books, teacher-made materials, and teacher resources, adjacent educable classes for primary or intermediate level children can provide both quantitative

and qualitative benefits not found in single isolated special classes.

The following content was provided:

- a. A discussion of methods for pooling teacher resources, talents, and students for related and combined programs.
- b. A determination of criteria for evaluating the suitability of commercial materials and books for primary and intermediate educable children.
- c. An analysis of various commercial textbooks, workbooks, supplementary books, teaching aids, and materials along with teacher-made materials that are relevant to special education.

4. Orientation Workshop.

This workshop was designed to provide a transition from the preparation year to the first year. The content of this workshop consisted of:

The Project Director's review of:

- a. The inductive teaching method.
- b. The social learning model.
- c. The procedures for the identification of significant social learning problems.
- d. Presentation of the spring survey of probable social learning problems among the experimental classes.
- e. Distribution of audio-visual and free materials resources lists for use in teacher planning.

5. Required Workshops in Curriculum Areas -- Social Learning, Language Arts, and Arithmetic.

After the initial training course and voluntary curriculum workshops had been completed, the program consultants worked closely with the teachers to implement the social learning curriculum and teaching method into the classroom educational

program. Essentially the consultant's time was devoted to three major problem areas: (1) problems concerning grouping, diagnosis, and remediation in the skill areas of language arts and arithmetic, (2) teacher difficulties in the application of the life function content of the social learning curriculum, and (3) problems of classroom management as an indirect consequence of teacher inadequacy in academic and non-academic areas. The last problem was observed as a major difficulty of inexperienced teachers.

Then the director and program consultants developed three curriculum supplements comprised of both diagnostic and instructional content to meet these three areas of difficulty. During three "attendance required" workshops, the consultants were able: (1) to introduce the newly developed curriculum supplements in language arts, arithmetic and social learning; (2) to reinforce the essential concepts developed earlier in the preparation course; (3) to present the most up-to-date curriculum materials, teaching aids, textbooks and workbooks in each respective curriculum area; (4) to sustain the esprit de corps of the teachers; and (5) to provide for sharing and cross-currents of communication.

The following explanations and sample pages reveal the organization and content of each curriculum supplement.

First, a supplement was devised to enable the teacher to diagnose social learning problems on an individual and/or group basis in order to have a qualitative and quantitative profile

of social learning problems. On the basis of this profile, the teachers made more accurate judgements in selecting the most appropriate units for the largest number of students.

The major elements of "Procedure for Assessing Social Learning Problems" are described below.

#### PROCEDURE FOR ASSESSING SOCIAL LEARNING PROBLEMS

##### Introduction

The social learning approach set forth in the Illinois Plan is based on the assumption that individuals experience a variety of problems which can be classified as belonging to one of the ten "life function" areas outlined in the guide. These problems will vary from child to child and from group to group. Therefore, planning a program which will successfully meet the most pressing needs of the greatest number of children in a specific class at a given time demands that this, or any other guide, be utilized in a highly selective manner. In short, it requires assessing each child's ability to function in each of the basic life function areas. It required isolating both individual and group problems. Unless such an assessment is made, deciding what problems should be dealt with in a social learning unit becomes either a mystical or a "hit and miss" affair.

The assessment procedure described below is intended to facilitate a systematic approach to the problem. It provides the "intensity quotient" or a quantitative measure of the severity of each child's problems and the frequency with which each of these problems are experienced by the other class members. The procedure enables the

teacher to gain an overview of the parameters of the problem found in his class.

The problem analysis is the first stage in the total procedure for developing a dynamic social learning unit.

Mechanics for Assessing Social Learning Problems Related to the Ten Life Function Objectives of the Illinois Plan Curriculum Guide

- I. Enter each child's initial in the top row of horizontal boxes found on each life function form.
- II. Evaluate the degree to which each child has a problem in meeting each curriculum objective. Use the following three point scale:

2 - Almost Always a Problem

(The child consistently experiences difficulty meeting the objective and does not have adequate knowledge or experience to solve the problem.)

1 - Sometimes a Problem

(The child experiences some difficulty in a less consistent fashion and/or may not have the complete insight or experience to always reach the objective.)

0 - Rarely a Problem

(Under unusual circumstances the child will occasionally have difficulty meeting this objective.)

- III. Certain problems stimulate thinking about other difficulties not listed by specific objectives but related to the general life function problems. Therefore, write down these additional problems and rate each student accordingly.

Thus these additional objective problems stimulate an appraisal of the children along dimensions not covered in the curriculum.

- IV. After all additional problems have been listed, total each objective rating horizontally and enter the total in column at right; e.g.,

\*Self Help  
\*Manners      2 1 2 2 2 2 2 0 0 0 2 = 15

\*Taken from an actual analysis of a primary educable class used in a pilot trial of the procedure.

The horizontal total reflects a cross section of the class and reveals the frequency of intensity of the problems of the entire class in reaching this objective.

- V. a. Vertically add all scoring totals in the right hand column to obtain a sum at the bottom of the page.
- b. Repeat the process on each succeeding page.
- c. Enter each page total on the last page and obtain an overall total.

e.g.

*Page 2 - Social Adjustment - Total B	79
	<u>Total A+ 112</u>
Overall Total	191

- VI. Count up the number of objectives containing problems - e.g., 20 (do not include objectives with only zero ratings)
- VII. Obtain an intensity quotient by dividing the overall total by the total number of objectives with problem ratings of 1 or 2.

e.g.,

	9.5
20	119.0

9.5 = intensity quotient for Social Adjustment

- VIII. Repeat the procedure on the assessment form for each life function and obtain an intensity quotient.
- IX. Compare the intensity quotients and determine the descending order starting with the highest quotient.

e.g.

*Social Adjustment	9.5
*Citizenship	8.7
*Physical and Mental Health	7.1
*Home and Family	6.1

These final quotients enable the teacher to quantitatively define the frequency and intensity of the problems for each life function area and facilitates a priority judgement as to the most relevant unit that will reach the largest number of children with the greatest amount of serious problems.

\*

Taken from an actual analysis of a primary educable class used in a pilot trial of the procedure.

X. The demonstration forms may show that the highest intensity quotient for Social Adjustment suggests that this may be the most appropriate first unit. However, a perusal of the Social Adjustment assessment form reveals such a wide variety of "two" problem ratings that it would be impossible to develop objectives to solve all these problems in one unit. Therefore, the teacher must delimit the number of objectives with his unit. The subgroupings of objectives, e.g., Self Help etc., tend to form clusters of associated objectives. Thus, the teacher must determine which additional objectives are related to the specific objectives. Then, she can compare subgroupings to pick the most crucial subgrouping of problems. For example:

		Total	
	I. - Sharing	46	
Additional Objectives listed as problems:	{	- taking others' property without permission	6
		- poor work habits	11
		- competing for teacher's attention	12
			75
	II. - Group Relationship	42	
	{	- noisy in halls and bathroom	9
		- distracts group	5
		- poor sportsmanship	8
		- refuses to cooperate with team captain	9
		- unable to pick a side and designate responsibilities	9
		82	

Normally, the quantitative differences would indicate the proper cluster. However, the sub-objectives of Sharing and Group Relationship are so quantitatively similar that the teacher can make a clinical selection based upon his qualitative assessment. Since several of the objectives in listening and talking will be covered in the language arts periods, the "II - Group Relationship" objectives became the choice for the first unit. Please note that this technique is only applied when all the objectives cannot be covered in a single unit.

- XI. Now that the assessment process has enabled the teacher to pinpoint the most serious cluster of problems, she is ready to evaluate the specific problems of the children in meeting these objectives.

At this stage, the teacher is trying to identify the problems at the most specific and operational level rather than at the abstract level of the objectives, e.g., "failure to cooperate as a follower." The individual differences of the group, as expressed by a "one" or "two" rating, must be delimited into operational problems in which the teacher can work to affect a behavioral change.

Essentially the entire life function approach involves the following steps:

- (1) Identification of individual problems in terms of the intensity and frequency of their occurrence.
- (2) Determination of common class problems in each life function area.
- (3) Isolation of the most critical life function problems which are based on the quantitative intensity and frequency of common class problems.
- (4) Translation of the life function area problems into their appropriate environmental levels (teaching units).
- (5) Employment of the environmental level analysis in spelling out the specific objectives and content of an appropriate social learning unit.
- (6) Correlation of knowledge area subjects and social studies content to meet the unit objectives.

Next, a curriculum supplement for the language arts was developed to aid E teachers in making cogent observations of levels of language skill development. The supplement also provided treatment procedures for language skills.

Generally, the supplement was divided into four sections representing the language areas of:

1. listening
2. speaking
3. writing
4. reading

Each of the four language areas was divided into two parts -- (a) diagnosis and (b) treatment.

To give the teacher a general overview of the four language areas, a Language Behavior Checklist was provided. The checklist enabled the teacher to make gross language evaluations on each child. To define the gross language evaluations the manual offered specific informal tests which the teacher could administer.

For each child in the class the teacher was given a diagnostic manual. In it the teacher could assess aspects of the child's language development. As the teacher made language analyses, she could begin to group children for instruction on a specific skill deficit basis.

Sample pages (1) and (2) are taken from the "Language Arts Skills Program Manual." Page (1) shows informal diagnostic tests for assessing aspects of auditory discrimination. Page (2) lists treatment activities for remedying skill deficits in auditory discrimination. These can be applied to individuals, small groups, and large groups (SAMPLE PAGE 1).

Test B Discrimination of Initial Sounds (Diagnosis)

Directions:

1. Turn child's chair away from you so he cannot see your lips.
2. Say: "I am going to say some pairs of words. Sometimes the words will begin with the same sound. Sometimes they will begin with different sounds. You tell me whether they begin with the same sounds or with different sounds."

Sample: cry - dog      S D      If the child makes an  
          boy - baby      S D      error, correct him.

3. **Analysis:** Note the nature of the child's errors. Determine whether the child is having difficulty with initial vowels or consonants and which particular initial sounds are giving difficulty.

(1)	pet - bear	S D	(11)	voice - board	S D
(2)	at - eat	S D	(12)	ice - it	S D
(3)	ten - duck	S D	(13)	read - rode	S D
(4)	open - over	S D	(14)	old - use	S D
(5)	kit - kite	S D	(15)	man - news	S D
(6)	up - use	S D	(16)	apple - end	S D
(7)	goat - corn	S D	(17)	tip - take	S D
(8)	eve - earn	S D	(18)	ask - it	S D
(9)	money - me	S D	(19)	sun - zebra	S D
(10)	ice - each	S D	(20)	odd - eve	S D

**Analysis:**

**Test C Discrimination of Final Sounds**

**Directions:**

1. Turn child's chair away from you so he cannot see your lips.
2. Say: "I am going to say some pairs of words. Sometimes the words will end in the same sound. Sometimes the words will end in different sounds. You tell me whether they end in the same sound or in different sounds."

Sample: see - dog S D If the child makes an error,  
can - fun S D correct him.

Sample Page 2  
From "Language Arts Skills Program Manual"

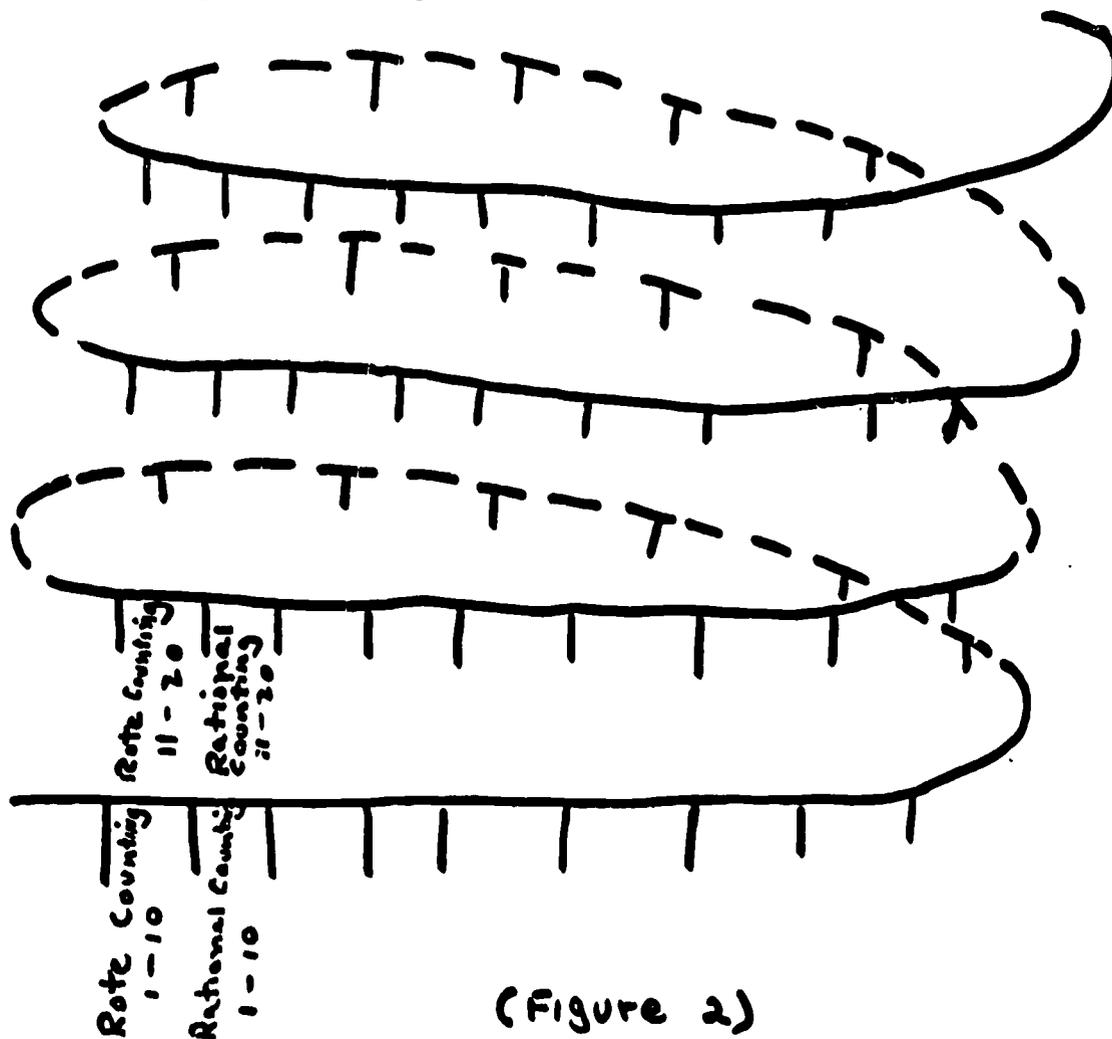
LISTENING (TREATMENT)

Auditory Discrimination

In general, any of the diagnostic tests will serve as models for developing exercises to treat auditory discrimination difficulties. In addition the following list of activities is offered to help you teach auditory discrimination skills. The list is arranged from the gross to more refined skills in this area.

1. Ask the children to close their eyes. Have one child speak and ask the other to tell who has spoken.
2. Have the children close their eyes. Tap on the wall, radiator, blackboard, etc. Ask the children to tell what you tapped.
3. Tap twice softly and once loudly. Ask the children to tell whether the first tap was loud or soft. Vary the tapping sequence and continue the questioning.
4. Have the class or a small group close their eyes and be as quiet as possible. Ask them to listen for and remember all the sounds they hear inside or outside the room. After thirty seconds have the children report on the sounds they heard. Have them reproduce the sounds and indicate the location of the sound source. Increase the length of listening time as the children demonstrate the ability to attend for longer periods.
5. Tell the students that you will pronounce a word. They are to listen carefully and think of any word that begins with the same sound. Examples: look, like, lone, lost. Use other initial sounds. Begin with consonant sounds and work toward vowel sounds.
6. Have the children submit words based on some structure. Example: There are many things to each which begin with the same sound as these words -- came, card, cut. (Emphasize the initial sound.) Other questions may be posed about things to wear, names of animals, names of children, street names, names of flowers. Vary the initial sounds as needed.
7. Repeat activities #5 and #6 using medial and ending sounds as variables. (long o, a, e, etc. short vowel sounds.)

Finally, a curriculum supplement was constructed to aid the diagnosis and teaching of arithmetic skills and concepts. The supplement was based upon a helix type model which illustrates the reoccurrence of each arithmetic skill at higher levels of conceptualization and operation (Figure 2).



Thus, arithmetic skills can be seen as analogous to building blocks, whereby each separate skill is a prerequisite or foundation upon which further skills or concepts are developed.

The position and order of presentation of the general content of each skill was organized and presented as an "Overview of Arithmetic Skills" (partially reproduced upon sample page 3).

The "Overview" was composed of ten levels of ascending complexity and further divided into the fourteen skill arithmetic areas of: a) readiness, b) rote counting, c) rational counting, d) number recognition, e) number sequence, f) number writing, g) simple grouping, h) place value, i) addition, j) subtraction, k) multiplication, l) division, m) simple measurement and n) problem solving. Within each skill area the major concepts of facts were presented in a vertical column according to increasing levels of difficulty. Thus, the "Overview" could be employed as a road map since the major concepts were placed in perspective as they were related to each other. Furthermore, the "Overview" could be used as a guide for the accompanying "Sequence of Arithmetic Skills Manual" (SASM). The four books of the SASM contained a very detailed series of teaching plans that corresponded to the organization of the content on the "Overview."

The SASM was organized to present each skill area in one section to allow the teacher to discover the interrelationships and totality of all the facts and concepts. However, the teacher develops the arithmetic concepts in a horizontal left-right progression, closely following the helix-type model. First, he teaches all the content found on the readiness level. Then he moves to level one, proceeds across level one, moves back to level two, and repeats the same procedure. In this way, the content of each skill area is presented in a manageable amount and inter-related to the next concept in the adjacent skill area. Once all content of the

Sample Page 3  
Partial Representation of

**"OVERVIEW OF ARITHMETIC SKILLS"**

I Levels of Complexity	II Rote Counting	III Rational Counting	<u>Skill Areas</u> IV Number Recognition	V Number Sequence
10				
9				
8				
7				
6			D. Extend Rapid identification of Number Symbols Beyond 10-100	E. Counting by two's fives - tens
5			C. Identification of written Number Names 1-100	D. Beyond Teen Numbers
4		D. Counting by two's - fives tens	B. Rapid Identification of Symbols 1-10	C. Teen Numbers
3	B. Beyond Teen Numbers	C. Association of Verbalized Numbers and Quantity	A. Association of Number Symbol and Quantity	B. One to ten
2	B. Teen Numbers	B. More or Less		A. Before and After
1	A. 1 - 10 etc.	A. Introduction 1. Types of Counting 1 - 10 and Beyond		
I Readiness	A. Form 1. Concrete a. Between Shapes (3D) b. Between Shapes (2D) c. Within Shape	Discrimination 2. Abstract a. Between Shapes b. Within Shapes	B. Visual 1. Size Estimation a. Object b. People	Discrimination 2. Assessment

same difficulty is taught, the teacher develops the next higher level of conceptualization.

Sample pages 4 and 5 below were randomly selected from the SASM to show the specificity of the content as well as the organization of teaching plan required to present a concept. In order to provide adequate reinforcement in each stage, a large number of activities were provided. The teacher had the option to select as many of the most appropriate ones as she considered necessary.

The teachers received training in use of the overview for diagnostic testing and in ways to supplement the commercial textbook series and/or the Illinois Plan Guide with the new SASM.

In summary, the combination of inservice training sessions, materials workshops, and curriculum supplements to the Illinois Plan constituted the type of content training presented to the E teachers.

IX. ADDITION

D. Basic Addition Facts  
2. Number Families

PRIMARY STAGE

TEACHER PREPARATION

STRUCTURE AND INTRODUCTION

EXPANSION AND MASTERY OF LEARNING SKILLS AND CONCEPTS

Prerequisite Skills:

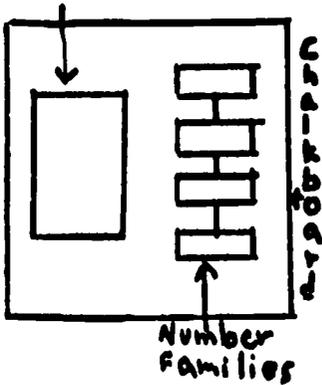
Ability to add number facts and recognize the components which make up each set of facts.

Organization of Children:

Form a horseshoe circle around the hundreds chart.

Physical Setting:

A Hundreds Chart



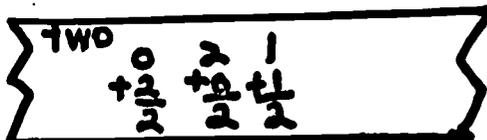
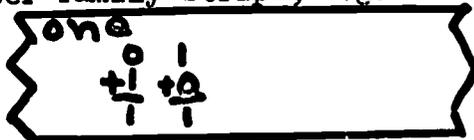
Note: Subtraction facts may be taught separately. However, since the process of subtraction is an inverse process of addition, the opposite subtraction facts can be developed simultaneously or slightly after the mastery of a particular set of facts.

Concept:

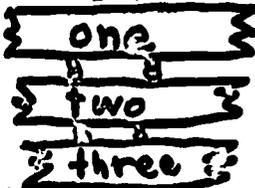
A number family represents all addition facts for that number.

Presentation:

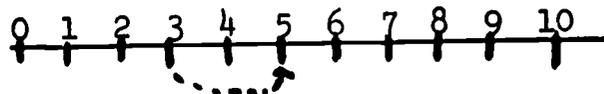
1. Using the hundreds chart, the class helps teacher construct number family strips, e.g.



Each number family is written on an oak tag strip and hung beneath previous strips, e.g.



2. Teacher introduces a number line to check facts.



e.g.  $3 + 2 = 5$

Materials:

M<sub>9</sub> Double Value Flash Cards

H<sub>11</sub> Abacus

Restatement of Concept for Children:

Each number family stands for the different ways we can add numbers to get that number as a total.

Reinforcement:

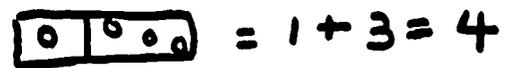
1. Teacher elaborates upon facts for each family by:

- Presenting facts by
- shape configurations
  - object configurations
  - horizontal and vertical algorithms

e.g.

- 0 0
  - \* \*
  - $1 + 1 = 2$
  - 1
- $$\begin{array}{r} +1 \\ 2 \end{array}$$

2. Children find dominoe blocks which illustrate a fact and work out fact with number symbols.



3. Facts can be displayed by different dot configurations.



4. Use Addition Perception cards. Match algorithm and correct total.



5. Use Flash cards with configurations on one side and algorithms on the other side.

6. Manipulate abacus to form various addition facts.

7. Try checking algorithms by using number line.

**SECONDARY STAGE**

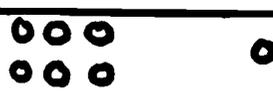
**TERTIARY STAGE**

**REINFORCEMENT FOR GENERALIZATION**

**APPLICATION OF GENERALIZATION FOR PROBLEM SOLVING**

Seatwork:

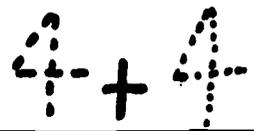
1. Match configurations and algorithms.

$\begin{array}{r} 4 \\ +1 \\ \hline \end{array}$	
$\begin{array}{r} 3 \\ +2 \\ \hline \end{array}$	
$\begin{array}{r} 6 \\ +1 \\ \hline \end{array}$	

2. Complete algorithms:

1	3	2
$\begin{array}{r} +1 \\ \hline \end{array}$	$\begin{array}{r} +1 \\ \hline \end{array}$	$\begin{array}{r} +1 \\ \hline \end{array}$

3. Write algorithm to match configurations:

4. Make the number families for the following numbers:

3	
6	
5	

5. Give random group of facts on work sheet. Have children reorganize into number families.

Games: Addition War:

1. Each child turns over a number card. The first child to successfully add the two numbers get to keep cards.
2. Flash card baseball. Class divided into two teams. Teacher acts as pitcher by displaying flash card. If child adds correctly he gets a base hit; if he makes a mistake he is credited with an out. Variations after adding correctly, child must name number formally which contains fact.

Classroom:

1. Class is divided into two groups. Children are each given a consecutive number card (e.g., if there are ten children there would be two sets of 1 - 5). Person who is "IT" calls out a problem using numbers held by children, e.g.  $2 + 8 =$  or  $4 + 1 =$ . Pupils holding either number stand. First on with correct answer either gets a point or switches places with "IT."

2. Letter carrier - Each child is given a number. Letter carrier has problems written on cards, e.g.  $4 + 3 = \underline{\quad}$  or  $4 + \underline{\quad} = 7$ . Carrier must work problem and select child holding the proper total as living at the proper address. If child at address can prove that the answer selected by postman's incorrect and letter was delivered to wrong address, he becomes letter carrier. If both are wrong and another child picks up mistake, he is made letter carrier.

Games:

3. "Who Am I?" Child says, "I am three and two. Who am I?"
4. Street Car - chairs are arranged in two rows. One child acts as a conductor and other children are seated in chairs. Conductor asks question that is considered as a "fare" (e.g., "7 is 4 and  $\underline{\quad}$ ." If correct answer is given, fare is paid. If wrong answer is made child must get off for failure to pay fare. Children may regain entry by correctly answering problem missed by another child. If conductor fails to discover a wrong answer, another child can correct him and become the conductor.

Teacher can vary game according to age and interest of group, e.g. airline hostess - railroad conductor, etc.

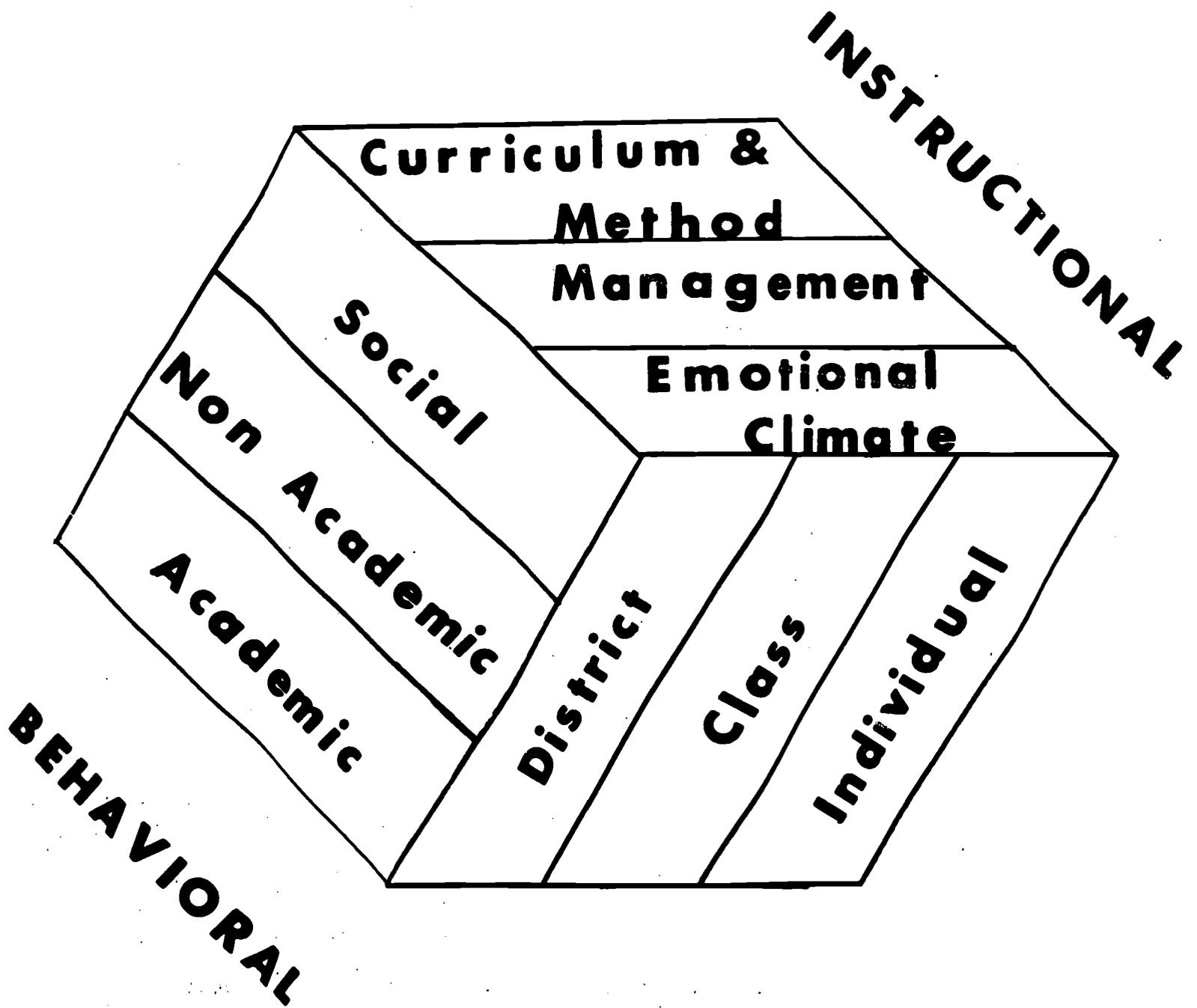
## APPENDIX C

### Role of Program Consultants

The major responsibility of the program consultant was to function as a project "trouble shooter" and to assist the E teachers in the adoption of the social learning curriculum and teaching method to fit the circumstances found in their classrooms. The consultant's modus operandi was the "helping teacher" partnership, rather than an autocratic relationship usually found in a supervisory approach.

However, before the E teachers could implement the curriculum and method into their programs, they called upon the consultants to help resolve a multitude of non-project procedural, organizational, and/or personal difficulties that had been interfering with their educational programs. Implicit in the consultant's functions was the objective of encouraging and/or affecting teacher change in order to reduce these problems and to pave the way for the successful incorporation of a social learning curriculum and teaching method.

The consultants operated from the conceptual frame of reference that any classroom problem could be analyzed among three dimensions. Figure 3 illustrates the hypothesized parameters of classroom problems. It is to the resolution of these problems that the teachers and consultants mutually addressed themselves.



## ENVIRONMENTAL

(Figure 3)

The Instructional Dimension is comprised of three types of teacher performance. "Curriculum and Methods" refers to the lesson content and how the content is presented. "Management" refers to

organization and execution of all aspects of the daily program. Finally, the "Social-Emotional Climate" refers essentially to the effects of the teacher's feelings, opinions, attitudes, and expectations as they relate to the teacher, the students, and/or the school. These three aspects are not mutually exclusive. Their interrelationships must also be studied when considering the impact of the instructional dimension upon a problem. That is, what effect does teacher behavior or performance have upon the existence or creation of a classroom problem?

The Environmental Dimension is the specific element of the physical context in which the problem exists. Proceeding from the whole to its parts, the "District" aspect refers to the total school district and its concomitant policies and practices. The "Class" aspect refers to the cumulative effects of all the members of a special class. Finally, the "Individual" aspect refers to one student and how his performance affects the problem.

The Behaviorial Dimension refers to the type of problems that influence various student classroom actions. The "Academic" aspect refers to all systematic learning traditionally placed under this heading. "Non-academic" aspects include music, art, physical education, etc. The "Social" aspect refers to interpersonal relationships, self control, and/or discipline.

Within this model, the teacher and consultant can start to isolate the relevant dimensions of any problem. An illustrative example of a classroom problem concerned Miss M., a second year teacher, who was unable to complete an entire inductive teaching

sequence in social studies. After a lengthy discussion, the consultant uncovered the parameters of the problem as illustrated by Figure 4 below.

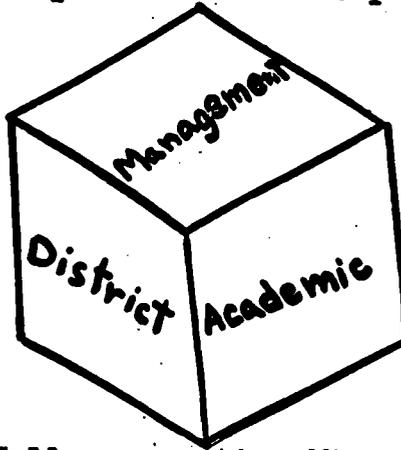


Figure 4 Cell representing Miss M's classroom problem.

Along the Instructional Dimension, Miss M had a positive attitude toward the students and demonstrated some competency in the use of the experimental curriculum and methods. However, her organization of the classroom setting or Management Dimension was haphazard. She allowed known trouble-makers to sit together. Their desks were too closely placed on one corner of the room. She kept her back to the seat-work groups during the reading lessons. Her teaching approach stressed individual tutoring; but she failed to provide sufficient independent seatwork for the unoccupied children during the tutoring period.

From the Environmental Dimension the problem had District connotations. The class contained a disproportionate number of hyperactive and aggressive children when compared to other special classes in the school building, and the teacher could not exert any control over the composition of the class membership. This condition reflected a planning and administrative deficiency at the school district level.

Finally, the Behaviorial Dimension of the problem was of an academic nature. The teacher could not finish the social studies lesson without disruptions from the hyperactive children. From this perspective all were non-readers who could not keep up with the oral reading in the social studies lesson, and so expressed their frustration during the discussion period.

Steps were taken to remedy the situation. The consultant helped the teacher improve her management techniques by rearranging the seating plan, respacing the desks, and having the teacher face the seat work groups during her reading period. More seat work was introduced to reduce the amount of free time. From the academic aspects, the children's reading problems were reduced by increasing their reading periods and the content of their reading lessons. Furthermore, they were given non-reading projects to complete as part of the social studies lesson. However, as a last resort, the Director of Special Education had to be contacted due to the overbalance of hyperactive children. He was able to shuffle students in the three special classes until a more equitable arrangement was achieved.

Because one of Miss M.'s main problems was being resolved, the consultant was able to return to promoting the utilization of the treatment variables. He then could shift the focus of the teacher-consultant conferences to the content and suitability of her social studies program.

Miss M's problem was fairly simple to analyze. However, the interdependent relationships between dimensions illustrates the need

to continue the dimension analysis of even more complex situations and difficulties in hopes of unwinding more intricate relationships.

The teacher can influence student behavior and thinking by altering her behavior along any three of the problem dimensions. With the proper blending of teaching strategy or method and the appropriate content, the teacher can convey the essential information necessary to change children's behavior. By manipulating the children's movement and their physical surroundings, the teacher can greatly influence group cohesiveness, disruptions, conservation of materials, and many other phenomena which cause problems. Finally, the teacher's reaction and encouragement can have a motivational influence upon the students. If the teacher can conceptualize the problem's parameters, flexible alternatives can be applied to solve educational problems and to change student behaviors.

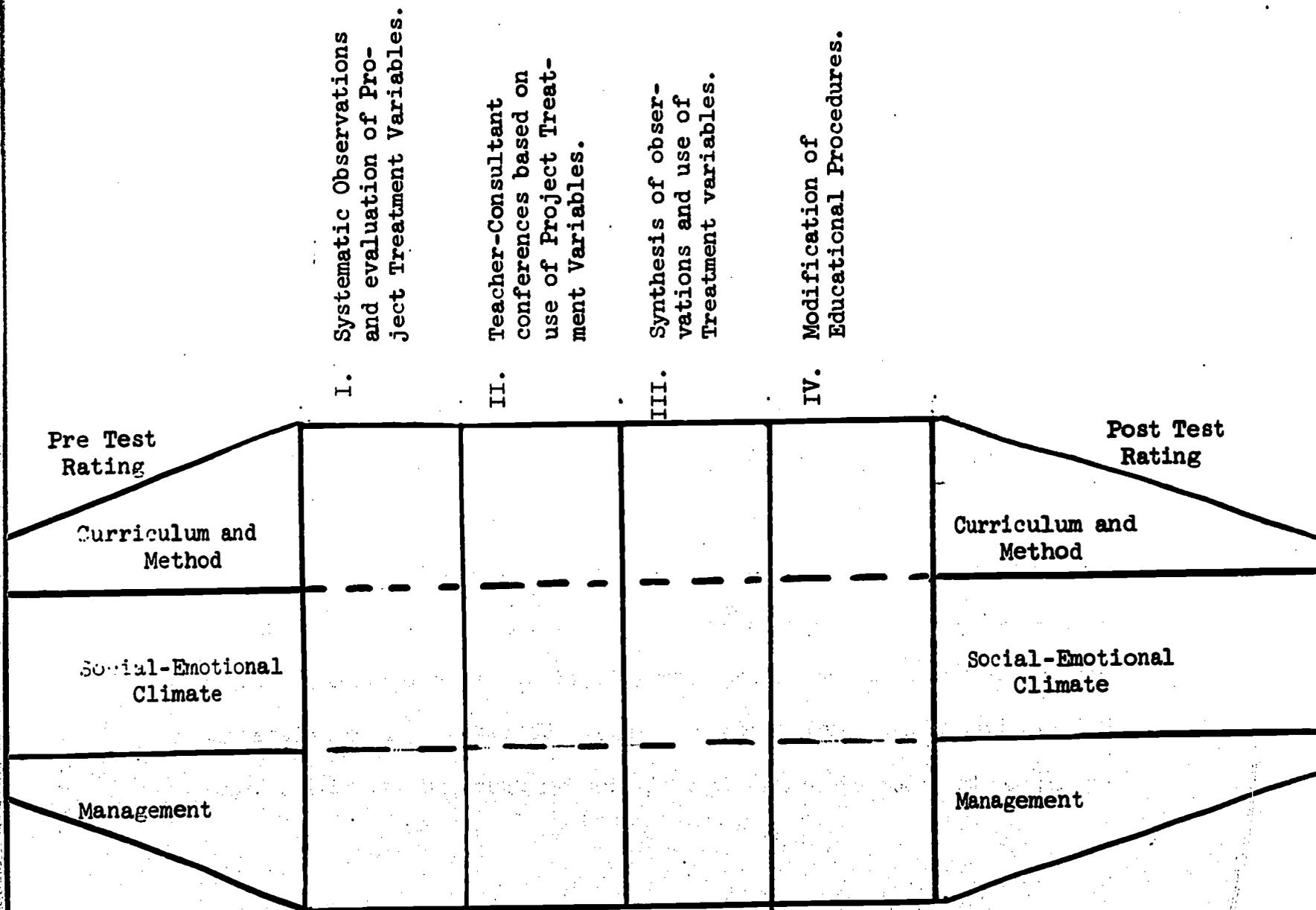
It is equally feasible to reduce classroom problems through administrative practices such as team teaching; the use of resource teachers, and/or by employing procedures along M.A. or academic skills lines. The behavioral dimension of the problem can be altered by the introduction of a different curriculum and/or course of study.

However, only a school system can initiate changes to affect all three dimensions of classroom problems. Since it was beyond the province of the study to recommend major administrative and/or curricular revisions, the main area of concentration was to develop teacher or instructional change among "typical" educable class teachers in a variety of regional school settings. Therefore, the consultants attempted to interact primarily with the teachers and not with admini-

strators and/or policy makers such as the Board of Education or the State Department.

As the consultants continued to work during the first year of the project, a definite plan of operations emerged. Figure 5 illustrates the operational model of affecting teacher change through consultative services.

Within Figure 5, the consultants have four major alternatives that vary according to the degree of consultant involvement and the degree of actual instructional change required. An analysis of each step will reveal the procedures and practices of the program consultants as they attempted to help create or encourage teacher change.



(Figure 5) Consultant Service and their Relationship to the Instructional Problem Dimension.

All activities start from the mutually agreed upon goals of employing the Illinois Guide Curriculum (Goldstein and Seigle, 1958) and the inductive teaching method as the treatment variables in the E classes.

As Step I, the consultants maintained bi-monthly visitations to each of the E classes. As the consultants observed the teachers and students interactions, they kept a written anecdotal log of the key problems, major activities of significant verbal exchanges and of important background information. Secondly, the consultants maintained a series of one-half time samples of the amount of instructional time and the amount of non-instructional time. At the end of each visit, the consultant evaluated each lesson on the Lesson Observation Summary Sheet (LOSS -- shown in Appendix E), using their anecdotal records and time samples. Due to the excessive amount of paper work the LOSS form was revised during the second project year. Instead of the LOSS, the Observers Summary Sheet (OSS -- shown in Appendix E) was devised to record a summary of the entire observation. The form included a narrative description and a summary check list to rate the teacher on the use of curriculum, method, and learning atmosphere. A seven-point scale was used. The form had provisions for a qualitative analysis of the instructional materials. A qualitative analysis of the components of the inductive method was also provided.

Regardless of the type of recording form, the anecdotal notes, time sample analysis, and/or the rating forms provided many topics and problems for discussion in the following step -- the teacher-consultant conference.

During Step II, conferences based on previous goals, major emphasis was placed upon the specific ways to incorporate the curriculum and teaching methods into the program. It was at this stage that major independent problems or difficulties related to the curriculum and method were exposed. Within the reciprocal helping teacher relationship, many alternatives, ideas, and criticisms were candidly exchanged. This dialogue was qualitatively different from the directive type that might occur between teacher and supervisor. Since the consultants were not members of the administrative staff, the teachers responded more freely as the rapport developed with the project staff. Secondly, the emphasis upon testing the efficacy of the curriculum and method enabled the teacher to present constructive information related to the treatment approach. For instance, their evaluation of the curriculum was an impetus for the development of the three related curriculum supplements. Consequently, the teacher-consultant conferences generally resulted in a mutually agreed upon course of actions to solve the teacher's difficulties.

To provide a consistent follow-up on procedure, the consultant developed a continuous Problem Flow Chart, shown in Appendix E. As seen on the flow chart, the essential problems were identified and the main points of the discussion and recommendations were recorded and dated. On the next visit the consultant obtained a progress report on the efficacy of the specific recommendations. In other situations the shortcomings of the recommendations were noted and a new modification was generated through a follow-up discussion between

the teacher and consultant. The modification was then initiated and a subsequent follow-up discussion and evaluation would ensue. The process was repeated until the problem could be resolved.

The technique was an effective approach with receptive teachers. However, in certain instances, the teacher recognized no problems and felt that the consultant's comments were irrelevant or inconsequential. Diplomacy and tact were consistently employed as the consultants tried to establish rapport and develop the type of relationship in which the teacher would feel secure enough to discuss his shortcomings and problems. In other situations the teacher did all he could within an instructional framework. Ultimately, he would be forced to submit the problem to the psychologist and/or director of special education for administrative assistance.

Step III. Entitled "synthesis of observations and use of treatment variables," was the next logical step. In cases where the teacher's attention had been focused upon the problem, but where he had failed to carry through the suggestions, or where he did not understand how to incorporate the recommendations, the consultant tried more active approaches to effect teacher change. One valuable technique was to take over the class and demonstrate how the technique could be employed with the present class members. This technique was particularly successful in demonstrating the inductive type questioning and restructuring. Curriculum supplements for diagnostic purposes were also demonstrated.

Another technique involved joint planning meetings with all the project teachers from the same district. In these meetings, the

life function problems were identified and subsequent unit content was suggested and organized to provide continuity between classes. Another active consultant service was the provision of a circulation library of film strips and curriculum materials.

The effectiveness of the third stage was vitiated by the lack of sufficient meeting time. Consequently, demonstration lessons and planning sessions had to be used sparingly when the Stage II conferences did not produce the expected changes.

Step IV. Modification of the education program phase, was instituted when the goals of the three previous stages did not materialize with certain teachers.

While the true effectiveness of the program consultants has not been measured, it appears that consultative services had beneficial effects for the special class teachers. In lieu of systematic supervisory visits, the isolated special class teacher relied upon the consultants as a source of professional information, stimulation, and encouragement. The candid working relationship enabled the consultants to utilize teacher criticism to improve training techniques, to refine the curriculum, and to improve the selection of instructional materials.

**Manual of Instructions for the Tape Recording  
Classification System**

**by Esther Hirsch**

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## INTRODUCTION

This classification system was designed to determine whether the experimental and control teachers in FOE D-016 were using Goldstein's inductive teaching method. The construction of this classification system was influenced primarily by Goldstein's conceptualization of the inductive teaching method and secondarily by the Gallagher-Aschner Classification System as well as Bellack's system. Anyone intending to learn this classification system is required to read Goldstein's FOE D-016 demonstration proposal, the Gallagher-Aschner Classification System Manual, and Bellack's Manuscript "Language in the Classroom".

This classification system differs from most others because it has a set of categories for teacher statements and another set for student utterances. This dichotomy was made because of the different roles teachers and students occupy in the classroom communication process. Secondly, this classification system was designed to make sequential analyses or discover patterns of teacher and student categories which seem to "go together". Thus, the categories for teacher and student utterances can best be comprehended in their inter-relationships to each other.

The following procedure will be used to analyze the tape recordings made for the Goldstein study:

(1.) Once a month a 20 minute tape recording will be made for each experimental and control teacher. Different subject matter areas will be recorded each month. The same classification system is used for all subject matter areas.

(2.) The tapes will be transcribed and typed into tapescripts.

(3.) Two judges will independently code each tapescript without knowing if an experimental or control teacher's performance is being analyzed. These judges will have undergone supervised training on five practice tapescripts. The following steps will be involved:

(a.) The judges will break the tapescripts into units.

A unit is equivalent to one of the categories of this classification system. A unit may vary in length from one word to many paragraphs. After unitizing the tapescripts, the judges will code them.

(b.) After categorizing the tapescripts the judges will compare their results. In cases of disagreement the judges will resolve the differences. If this is not possible, a third judge will be consulted.

(c.) Periodically several hundred units will be randomly selected to obtain an index of inter-judge agreement.

The next section presents descriptions and examples of the four teacher categories and the five student categories. The third section presents unitized tapescripts and completed record sheets. Finally, a summary sheet of category abbreviations and definitions is provided.

#### TEACHER CATEGORIES

From the point of view of this classification system the teacher has four major roles: (1.) to structure the classroom situation so that students will perform academically (i.e., the teacher must provide the stimuli to which the students are to respond) (2.) to react to the student's academic performance after it has been emitted (i.e., to provide feedback for the student's responses) (3.) to present information to students (4.) to manage the routine classroom affairs which are not directly related to academic content. It can be seen that the first three roles are directly involved in the teaching-learning process, while the fourth sets the stage so that this process can occur. These four roles are the same as the four major categories for teacher utterances.

##### 1. Structuring (st).

The purpose of these utterances is to structure the classroom situation so that the students will respond. Structuring utterances only refer to responses involving academic content. Therefore, a question such as "Where is your pencil?" would not be classified in this category. All questions, commands, and requests requiring the student to respond academically fall into this major category. This category is sub-divided into two secondary categories:

##### A. Structuring for memory responses from students (st-m).

This type of structuring requires that the student only use memory or cognition or perception to respond appropriately. No use of a higher level mental process is requested by the teacher.

Examples of such teacher utterances are:

"Who discovered America?"

"Read the first line there."

"What's 2 and 2?"

"Draw a line under the picture of the garage."

"How do you spell March?"

"What's the sound at the beginning of the word big?"

In a reading lesson structuring for reading, writing, spelling, memory questions following reading, and phonic analysis of words would be categorized in St-m. In an arithmetic lesson structuring for counting, simple adding, subtracting, and place value labeling would be coded here. All questions or requests for fact stating; review of previous classroom material; definitions; reading; writing; and spelling are coded in this category.

Although this category requires the use of no mental process other than cognition or memory, not all utterances in this category can be considered easy. For example, the question, "What is the formula for the Pearson Product Moment Coefficient of Correlation?" involves only the mental process of memory, and yet it is not a simple question.

In terms of Guilford's Structure of Intellect, this category encompasses questions, requests or commands for the students to use the processes of cognition and/or memory.

B. Structuring for integrative responses from students (St-e)

This second type of structuring requires that the student use a process other than memory and/or cognition to make his response. Questions, requests and commands in this sub-category require the student to utilize such processes as association, categorization, explanations, reasoning, generalizing, evaluation, make implications, inferences, etc. All such higher level mental processes are encompassed under the rubric of integrative processes. In terms of Guilford's Structure of Intellect these structuring moves would require the students to use the processes of convergent, divergent, or evaluative thinking.

Some examples of teacher utterances classified as St-i are:

- "If John had 10 apples and he lost 3, how many apples does John have?"
- "What is the difference between jobs for men and jobs for women?"
- "Do you like your new book?"
- "Why do you say you're not ready to quit school yet?"
- "Name all the holidays you can."

In a reading lesson St-i utterances might be questions after reading a story which involve prediction, inference, etc. In arithmetic word problems in which the student must determine which mathematical process to use and computation problems involving carrying or borrowing would be coded in this category.

Although structuring moves in this category require the student to use a mental process other than cognition and memory, not all st-i utterances are difficult. For example, the question "How are an apple and a peach alike?" is a simpler question than "What is the formula for the Pearson Product Moment Coefficient of Correlation?", and yet the former involves an associative process whereas the latter requires only the use of memory. It is imperative that the difference between St-m and St-i NOT be made on the basis of easy-difficult, but rather on the mental process which the teacher is requesting the student to use.

Also, when deciding upon the difference of St-m and St-i consideration should only be given to the mental process the teacher is requesting the child to use, and NOT what process the child actually produces. This differentiation should be kept in mind when coding so that when the teacher asks for the use of one type of process (e.g., St-i) and the child produces a response with another type of process (e.g., memory) this can be analyzed.

## II. Reacting. (Re).

After the student has responded to the teacher's structuring for performance, then the teacher reacts to the student's performance. Statements are coded in this category if the student's response involves academic content. Reactions to non-academic student performance are not categorized here.

For example, if a teacher asks "Do you have a pencil?" and the student responds "Yes", then the teacher's reaction of "Good" to the latter would NOT be coded in this category because the student's response does not involve academic content. Utterances coded in the reacting category may be viewed as feedback. Reacting responses are sub-divided into four second categories:

A. Reacting responses that provide reinforcement (Re-R).

Statements providing positive or negative reinforcement for a student's previous response are classed here. Examples of positive reinforcement would be:

"Good thinking."

"Right".

"You did a nice job of reading today."

"I like the way you wrote your o's."

These statements would be coded as Re-r+. The plus sign after the category abbreviation denotes that positive reinforcement has been given.

Examples of negative reinforcement would be:

"That's not right."

"You can do a better job of reading than that."

"That's not how you spell girl."

These statements would be coded Re-r- to show that negative reinforcement was given.

Teachers often repeat or paraphrase the student's response without giving any positive or negative reinforcement. If this occurs, then code this as Re-rn to show that this is "neutral" reinforcement.

**B. Reacting responses that require the student to evaluate his or another child's previous response (Re-E).**

Examples of this secondary category would be:

"Is that how you spell horse?" (After the student has spelled it h-o-s-e).

"Is that right?"

"Is that what I asked you to write?"

These statements may follow a correct or incorrect student response; however, they more often seem to follow incorrect student performance.

**C. Reacting responses in which the teacher corrects the student's previous incorrect responses (Re-C).**

In these cases the teacher provides the right response after a student has responded incorrectly or inaccurately. Thus, these reacting responses can only follow incorrect responses by the student.

**D. Reacting responses in which the teacher re-structures the situation (Re-st).**

These occur after a student has responded incorrectly or inadequately or when there is more than one correct answer to the original question presented by the teacher. Re-structuring occurs when the teacher repeats or paraphrases the question she presented when she originally structured the class; when she adds more cues; when she clarifies the meaning of what she said previously; when she focuses attention on new and/or different perspectives, etc. Examples of this secondary category are:

"Look at that word again."

"I'll give you a hint. This word is a color name." (Said after student has read word blue as boy).

"Think of some more good names of dogs."

"Doesn't anybody in this room know what the janitor's job is?"

These are similar to structuring statements (both ST-i and St-m). The major difference between structuring and re-structuring is that the former presents a question, command, or request for the first time. That is, this question, command or request has not been responded to by a student previously; whereas, Re-st statements may present the same question, command or request but NOT for the first time. In cases of re-structuring students have previously responded to the question, request or command.

### III. Information (I).

These are statements in which the teacher gives facts or statements involving integrative processes. When the teacher gives an I statement she does NOT expect, nor does she want, a response from the students. When a teacher lectures, engages in a monologue, or answers a student's question her statements would be classed in the I category.

Examples of this class are:

"When you grow up you will get a job and you must be on time. If you're not on time, you'll get fired from your job."

"Columbus discovered America in 1492. He came with three ships. There were only Indians in America at that time."

In many cases the teacher gives facts before she asks a question. These facts are the foundation of the question to follow. If this is found, then the information is coded together with the question as structuring. If no question or structuring is found after the presentation of facts then this is coded as I.

The teacher's I statements may involve cognition and memory or higher level mental processes; however, in this category no distinction is made in terms of secondary categories.

### IV. Routine (RO).

This category involves utterances concerning non-academic matters. These may be questions, requests or statements. This major category is sub-divided into two sub-categories.

**A. Management (Ro-m).**

These utterances concern matters of managing the affairs of a classroom. These may be in the form of structuring (e.g., "Where is your pencil?") or in the form of statements (e.g., "We have no more blue paper left."). All statements, questions, commands, or requests referring to the management of classroom procedures are categorized here. Examples of this secondary class are:

- "After gym we'll have our snacks."
- "Did you bring a note from your mother?"
- "Pass these papers out to each person Billy."
- "Erase the blackboard Tommy."

**B. Disciplining (Ro-d).**

These utterances are a special type of management in which the teacher negatively reinforces children who are misbehaving. Examples of this are:

- "Stop talking right now."
- "Go sit in the hall until you learn how to keep your mouth shut."

Utterances in this category differ from Re-r- because the latter refers to negative reinforcement of academic performance by the student while Ro-d refers to non-academic content or misbehavior.

**STUDENT CATEGORIES**

**I. Responses (Rp).**

These are the student's responses to structuring or to reacting statements by the teacher. These student utterances can only occur after these two types of teacher utterances. Thus, a student's initial response to a teacher's structuring (St) would be classified here as well as his re-responding after the teacher has re-structured (Re-st), asked for an evaluation (Re-e) or given

reinforcement (Re-r). Responses are only classed here if they involve academic content. This major category is sub-divided into two secondary categories.

A. Responses involving the use of memory or cognition (Rp-m).

These responses usually follow St-m from the teacher, but may follow St-i inappropriately. To make this response the student need only employ his cognitive or memory processes.

Examples of this category are:

"Columbus discovered America."

"2 and 2 is 4."

(Reads from text) "Run Sally. Run. Run. Run."

"C-A-T" (spells cat).

All reading spelling, word analysis, and factual statements, would be classed here.

B. Responses involving integrative processes (Rp-i).

These responses usually follow St-i by the teacher, but may occasionally follow St-m. To make this response the student uses higher level mental processes such as reasoning, evaluation, association, etc. In terms of Guilford's Structure of Intellect the processes of convergent, divergent and evaluative thinking would be involved in making responses in this sub-category.

Examples of this are:

"If Bill had 10 apples and he lost 3, then he has 7 left."

"I liked this new book because the little boy gets a baby dog and I like baby dogs."

"Apple and peach are the same because you eat apples and you eat peaches."

The additional coding of a plus ( + ) or a minus ( - ) is put after every Rp-m and Rp-i response to indicate if the response is correct or not.

## II Evaluation (E).

These utterances always follow requests by the teacher for the student to evaluate a previous response. These previous responses may have been produced by the child making the evaluation or another child. Utterances in this category involve the student's making the actual evaluation of the response. Examples are:

"That answer shouldn't be five, it should be six."  
"I didn't do this right."

## III. Spontaneous remarks (Sp).

These are spontaneous questions, statements or commands not solicited by the teacher. These have only to do with academic content. Spontaneous utterances are sub-divided into secondary categories.

### A. Questions (Sp-q).

Spontaneous questions asked by the student of the teacher are classified here. For example:

"Who's the president?"  
"Why do the astronauts go up in space?"

### B. Statements (Sp-s).

Statements not solicited or structured by the teacher and involving academic content are classed here. Examples are:

"My brother has a book like this one."  
"Dutch people wear wooden shoes just like the ones in this picture."

Although spontaneous utterances are not directly asked for by the teacher, they are usually related to the ongoing discussion of the class.

IV. Routine (Ro).

These utterances do not involve academic content and refer to management or procedural affairs of the classroom.

Examples are:

"I lost my pencil."  
"Can I have another piece of paper?"  
"Do I have to do this in ink?"  
"Billy kicked me."

V. No response (NR).

If a student says he does not know the answer to a question or if he does not respond then these are classed in this category. Also, confused and muddled responses are coded here.

ADDITIONAL CODING

An X refers to uncodable utterances because of mechanical difficulties or questionable transcriptions.

In some cases it is necessary to double code the same utterance. Language is flexible because it can be used for different purposes at the same time. To take advantage of this flexibility utterances that fit into more than one category are double coded.

SAMPLE TAPESCRIPTS AND RECORD SHEETS

Below are sample tapescripts of a Social Studies and Reading lesson. The slash marks on the tapescripts separate the units. The number above each unit are used to record the category on the record sheets which follow. If an utterance was produced by the teacher the category is written under the T column and if it was produced by the student it is written under the S column. The number after the word teacher on the record sheet refers to the teacher's code number and the initials after the coder refer to the judge.

SAMPLE SOCIAL STUDIES TAPESCRIPT

T: / O.K., what did we talk about on Monday? the different kinds of what? /

S: / Friends. /

T: / No. / On Monday. Different kinds of what? /

S: / Neighbors. /

T: / Not neighbors. /

S: / Houses. /

T: / Different kinds of houses. / What did we say about different kinds of houses Randy? /

Randy: / Farm house. /

T: / Farm house. / And do you live on a farm? /

Randy: / No. /

T: / No. / What's a second kind of house we talked about? /

S: / A small house. /

T: / A small house. Right. / And the other house was a what? /

John: / Apartment. /

T: / An apartment house. Right. / And we talked about who lived in what kinds of houses and yesterday what did we talk about? /

S: / Next door. /

T: / Yes, that's right. We talked about the boy next door. / Now today we're going to talk about how we can help in the neighborhood. What's a job you can have in the neighborhood? /

Bill: / Newspapers. You can deliver them. /

T: / Oh, that's a good idea. / Do any of you have that job? /

Monty: / My brother has it. /

T: / Which brother has it? /

Monty: / Jimmy. /

T: / What's another job you can have? How about a job for girls? /

Gladys: / (Garbled). /

T: / I can't hear you. Put your hands down and speak. /

Gladys: / You can baby-sit. /

T: / Do you baby sit Gladys? /

Gladys: / Yeah. /

T: / Who's baby do you watch? /

Gladys: / My aunt's baby. /

T: / That's good. / What do you do with the baby? /

Gladys: / Play games with her. I feed her too sometimes. /

T: / Alright now I'm going to pass out some paper and I want you to draw a picture of the job that you have. Then I want you to write the name of the job under your picture. If you can't spell the words ask me and I'll write them on the board for you. Let's take some of the words now. How do you spell job? /

S: / J-o-b. ?  
 T: / Excellent. That was very good. You got that without any help from me. /  
 S: / How do you spell deliver? /  
 T: / I'll write it on the board here. D-e-l-i-v-e-r. (Writes deliver on the board) /  
 S: / I ain't got no jobs. /

Teacher 47

Coder JB

T	S	T	S	T	S	T	S
1 ST-M		26 RE-R+		51		76	
2	RP-M-	27 ST-M		52		77	
3 RE-R-		28	RP-M+	53		78	
4 RE-ST		29 ST-M		54		79	
5	RP-M-	30	RP-M+	55		80	
6 RE-R-		31 RE-ST		56		81	
7	RP-M+	32	X	57		82	
8 RE-RN		33 Ro-M	RP-M+	58		83	
9 ST-M		34	RP-M+	59		84	
10	RP-M+	35 ST-M	RP-M+	60		85	
11 RE-RN		36		61		86	
12 ST-M	RP-M+	37 ST-M	RP-M+	62		87	
13		38	RP-M+	63		88	
14 RE-RN		39 RE-R+		64		89	
15 RE-ST		40 ST-M		65		90	
16	RP-M+	41	RP-M+	66		91	
17 RE-R+		42 ST-M		67		92	
18 RE-ST		43	RP-M+	68		93	
19	RP-M+	44 RE-R+		69		94	
20 RE-R+		45	SP-X	70		95	
21 ST-M		46 I		71		96	
22	RP-M+	47	SP-S	72		97	
23 RE-R+		48		73		98	
24 ST-M		49		74		99	
25	RP-M+	50		75		100	

**SAMPLE READING LESSON TAPESCRIP**

- T:** / Open your books to page 24. / Look at the picture at the top of the page. Is that a picture of the city or the farm? /
- S:** / The farm. /
- T:** / Right. / Who's that in the picture? /
- S:** / Grandfather. /
- T:** / What's grandfather doing here? Look at the picture? /
- S:** / He's picking apples off the tree? /
- T:** / Good. He's picking apples. / What's he standing on? /
- S:** / A ladder. /
- T:** / Why do you think he's standing on a ladder? /
- S:** / The tree is too high and he can't reach the apples because they're too high up. /
- T:** / Right. / Alright Tom read the first paragraph. /
- Tom:** / (Reads from text) "Grandfather is picking apples from the tree. Dick wants to help Grandfather. Dick asks Grandfather what he can do. Grandfather tells him to hold the / ..... / (Tom can't read the next word).
- T:** "basket" (T reads the word for Tom).
- Tom:** "Dick is happy to hold the basket."
- T:** / Alright what did Dick do to help Grandfather? /
- S:** / Hold the basket for the apples. /
- T:** / Good. He held the basket. / Look at the word basket carefully so you will be able to read it because it's on the next page. Alright Lu Ann read next./

Teacher 46

Coder E H

T	S	T	S	T	S	T	S
1 RD-m		26		51		76	
2 DE-n		27		52		77	
3	RD-mt	28		53		78	
4 RE-R+		29		54		79	
5 ST-n		30		55		80	
6	RE-mt	31		56		81	
7 ST-m		32		57		82	
8	RE-mt	33		58		83	
9 RE-R+		34		59		84	
10 ST-m		35		60		85	
11	RD-mt	36		61		86	
12 ST-1		37		62		87	
13	RD-1+	38		63		88	
14 RE-R+		39		64		89	
15 ST-m		40		65		90	
16	RE-mt	41		66		91	
17	NR	42		67		92	
18 RE-C		43		68		93	
19	RD-mt	44		69		94	
20 ST-m		45		70		95	
21	RE-mt	46		71		96	
22 RL-R+		47		72		97	
23 ST-n		48		73		98	
24		49		74		99	
25		50		75		100	

## ABBREVIATIONS AND DEFINITIONS OF CATEGORIES

### Teacher Utterances.

#### I. Structuring (St)

- A. Structuring for memory responses from students (St-m).
- B. Structuring for integrative responses from students (St-i).

#### II. Reacting (Re)

- A. Reacting to student performance by giving reinforcement.
  - 1. Positive reinforcement (Re-r+).
  - 2. Negative reinforcement (Re-r-).
  - 3. Neutral reinforcement (Re-Rn).
- B. Reacting to student performance by asking for student evaluation of previous response (Re-e).
- C. Reacting to student performance by giving the correct response (re-c).
- D. Reacting to student performance by re-structuring (Re-st).

III. Informational statements (I) in which the teacher present information and does not expect a response from the students.

IV. Routine (Ro) are utterances involving non-academic matters.

- A. Management of classroom affairs (Ro-m).
- B. Disciplining (Ro-d).

### Student Utterances.

I. Responses to teacher's structuring or reacting (Rp)

- A. Responses involving memory (Rp-m).
- B. Responses involving integrative processes (Rp-i).

II. Evaluation (E) involves student's evaluating previous responses.

III. Spontaneous remarks (sp).

- A. Spontaneous questions (Sp-q).
- B. Spontaneous statements (Sp-s).

IV. Routine (Ro) refer to management or procedural affairs.

V. No Response (NR) to structuring or reacting by the teacher.

## APPENDIX E

### FORMS USED IN STUDY

1. Consultant Rating Scales
  - a. Use of the Curriculum
  - b. Use of the Inductive Method
  - c. Teacher Change
2. Lesson Observation Sheets (L.O.S.S.)
3. Observer's Summary Sheets (O.S.S.)
4. Problem Flow Chart
5. Response Set Questionnaire
6. I.R.E.C. Test of Basic Information

APPENDIX E

Consultant Rating Scale  
Use of the Curriculum (as of May 1967)

Item 1a

Teacher	Aspect	Consultant				
		Always Inappropriate	Usually Inappropriate	Semi Appropriate	Usually Appropriate	Always Appropriate
	1. Appropriateness and efficiency of ability grouping of children:					
	(a) Reading	/ 1	/ 2	/ 3	/ 4	/ 5
	(b) Writing	/ 1	/ 2	/ 3	/ 4	/ 5
	(c) Spelling	/ 1	/ 2	/ 3	/ 4	/ 5
	(d) Social Studies	/ 1	/ 2	/ 3	/ 4	/ 5
	(e) Health and/or Science	/ 1	/ 2	/ 3	/ 4	/ 5
	(f) Over-all Academic Areas	/ 1	/ 2	/ 3	/ 4	/ 5
	2. Sequence of learnings provided:					
	(a) Reading	/ 1	/ 2	/ 3	/ 4	/ 5
	(b) Writing	/ 1	/ 2	/ 3	/ 4	/ 5
	(c) Spelling	/ 1	/ 2	/ 3	/ 4	/ 5
	(d) Arithmetic	/ 1	/ 2	/ 3	/ 4	/ 5
	(e) Social Studies	/ 1	/ 2	/ 3	/ 4	/ 5

Consultant Rating Scale  
Use of the Curriculum (as of May 1967)

Teacher	Aspect	Consultant				
		Always Unstructured	Usually Unstructured	Semi Structured	Usually Structured	Always Structured
		1	2	3	4	5
	(f) Health and/or Science	/		/	/	/
	(g) Over-all Academic Areas	/		/	/	/
	3. Efficacy of instructional materials:					
	(a) Language Arts	/		/	/	/
	(b) Arithmetic	/		/	/	/
	(c) Social Studies	/		/	/	/
	(d) Health and/or Science	/		/	/	/
	(e) Over-all Academic Areas	/		/	/	/
	4. Social Studies					
	(a) Teacher assessment of life problems of students	/		/	/	/
	(b) Meeting of life problems of students	/		/	/	/
	(c) Learnings presented in a problem solving context based on life problems	/		/	/	/
	(d) Degree of correlation between social studies and other subject matter areas	/		/	/	/

**Consultant Rating Scale  
Use of the Curriculum (as of May 1967)**

Teacher _____	Consultant _____				
<u>Aspect</u>	<u>Rating</u>				
	Never /	Rarely /	Sometimes /	Usually /	Always /
	1	2	3	4	5
<b>5. Curriculum Emphasis:</b>					
(a) Stress on academic learnings	/	/	/	/	/
(b) Stress on social learnings	/	/	/	/	/
	1	2	3	4	5
<b>6. Learning atmosphere (i.e., teacher dominance and student dependence)</b>					
(a) Language Arts	/	/	/	/	/
(b) Arithmetic	/	/	/	/	/
(c) Social Studies	/	/	/	/	/
(d) Health and/or Science	/	/	/	/	/
(e) Over-all Areas	/	/	/	/	/
	1	2	3	4	5

Consultant Rating Scale  
Use of Inductive Method (as of May 1967)

Item 1b

Teacher \_\_\_\_\_ Consultant \_\_\_\_\_

Rating

Aspect

1. Type of teaching used most frequently in academic subjects:

(a) Language Arts	Between rote and directive	Between directive and inductive	Inductive
	/ 2	/ 4	/ 5
	3		
(b) Arithmetic	/ 2	/ 4	/ 5
	3		
(c) Social Studies	/ 2	/ 4	/ 5
	3		
(d) Health and/or Science	/ 2	/ 4	/ 5
	3		
(e) Over-all Academic Subjects	/ 2	/ 4	/ 5
	3		

2. Type of teaching used most frequently in non-academic subjects:

(a) Physical Education	Between rote and directive	Between directive and inductive	Inductive
	/ 2	/ 4	/ 5
	3		
(b) Music	/ 2	/ 4	/ 5
	3		
(c) Art	/ 2	/ 4	/ 5
	3		
(d) Over-all Non-academic Subjects	/ 2	/ 4	/ 5
	3		

**Consultant Rating Scale**  
**Use of Inductive Method (as of May 1967)**

Teacher \_\_\_\_\_ Consultant \_\_\_\_\_

Aspect	Rating				
	Rote	Between rote and directive	Directive	Between directive and inductive	Inductive
3. Type of teaching used most frequently in classroom management.	/ 1	/ 2	/ 3	/ 4	/ 5
4. Type of teaching used most frequently for academic areas, non-academic areas and classroom management combined.	/ 1	/ 2	/ 3	/ 4	/ 5
5. Appropriateness of use of inductive method in academic areas (Fill in only if rating of 4 or 5 was given to #1).					
(a) Language Arts	/ 1	/ 2	/ 3	/ 4	/ 5
(b) Arithmetic	/ 1	/ 2	/ 3	/ 4	/ 5
(c) Social Studies	/ 1	/ 2	/ 3	/ 4	/ 5
(d) Health and/or Science	/ 1	/ 2	/ 3	/ 4	/ 5
(e) Over-all Academic Areas	/ 1	/ 2	/ 3	/ 4	/ 5



**Consultant Rating Scale**  
Use of Inductive Method (as of May 1967)

Teacher \_\_\_\_\_ Consultant \_\_\_\_\_

	<u>Rating</u>				
<u>Aspect</u>	1	2	3	4	5
	Always Inapprop.	Usually Inapprop.	Semi Appropriate	Usually Appropriate	Always Appropriate
6. Appropriateness of use of inductive method in non-academic areas (Fill in only if rating of 4 or 5 was given to #2)					
(a) Physical Education	/	/	/	/	/
(b) Music	/	/	/	/	/
(c) Art	/	/	/	/	/
(d) Over-all Non-academic Areas	/	/	/	/	/
7. Appropriateness of use of inductive method in classroom management (Fill in only if rating of 4 or 5 was given to #3)					
(a) Physical Education	/	/	/	/	/
(b) Music	/	/	/	/	/
(c) Art	/	/	/	/	/
(d) Over-all Non-academic Areas	/	/	/	/	/
8. Appropriateness of use of inductive method for academic areas, non-academic areas, and classroom management combined (Fill in only if rating of 4 or 5 was given to #4)					
(a) Physical Education	/	/	/	/	/
(b) Music	/	/	/	/	/
(c) Art	/	/	/	/	/
(d) Over-all Non-academic Areas	/	/	/	/	/



Consultant Rating Scale  
Use of Inductive Method (as of May 1967)

Teacher \_\_\_\_\_ Consultant \_\_\_\_\_

Aspect

Rating

DIMENSIONS OF INDUCTIVE METHOD

9. Initial structure of stimuli in situation.

Always Disorganized	/	Usually Disorganized	/	Semi Organized	/	Usually Organized	/	Always Organized	/
1	2		3		4		5		5

10. Relevance of cues:

- (a) Selection of cues appropriate to child's vocabulary level.
- (b) Selection of cues appropriate to child's experiential background.

Always Inappropriate	/	Usually Inappropriate	/	Semi Appropriate	/	Usually Appropriate	/	Always Appropriate	/
1	2		3		4		5		5

11. Appropriateness of reinforcement (i.e., timing and nature of reinforcement).

Always Inappropriate	/	Usually Inappropriate	/	Semi Appropriate	/	Usually Appropriate	/	Always Appropriate	/
1	2		3		4		5		5

**Consultant Rating Scale  
Use of Inductive Method (as of May 1967)**

Teacher \_\_\_\_\_ Consultant \_\_\_\_\_

	<b>Rating</b>				
<b>Aspect</b>	<b>Never</b>	<b>Rarely</b>	<b>Sometimes</b>	<b>Usually</b>	<b>Always</b>
12. Teacher's response to incorrect student response:					
(a) Asks for student evaluation	/ 1	/ 2	/ 3	/ 4	/ 5
(b) Re-structures	/ 1	/ 2	/ 3	/ 4	/ 5
(c) Rephrases	/ 1	/ 2	/ 3	/ 4	/ 5
13. Opportunity provided for children to discover the underlying generalization					
(a) By pupils	/ 1	/ 2	/ 3	/ 4	/ 5
(b) By teacher	/ 1	/ 2	/ 3	/ 4	/ 5
14. Summarizing at the end of a sequence:					
(a) By pupils	/ 1	/ 2	/ 3	/ 4	/ 5
(b) By teacher	/ 1	/ 2	/ 3	/ 4	/ 5

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APPENDIX E

Item 1c

Consultant Rating Scale  
Teacher Change (from Sept. '65 to May '67)

Teacher \_\_\_\_\_ , Consultant \_\_\_\_\_

Aspect of Change

Rating

Aspect of Change	Rating				
	1	2	3	4	5
1. Use of inductive method - degree of change necessary at start of study	Maximum Change Required	Between Change Required	Medium Change Required	Between Medium Change And No Change Required	No Change Required
2. Use of inductive method - amount of change made by teacher at end of study (Do not fill in if #1 rated as 5)	Maximum Negative Change	Limited Negative Change	No Change	Limited Positive Change	Maximum Positive Change
3. Independence in use of inductive method at the end of the study (i.e., teacher does not need consultant anymore)	Maximum Need	Between maximum & medium need	Medium Need	Between no & Medium Need	No Need
4. Use of experimental curriculum - degree of change necessary at start of study.	Maximum Change Required	Between maximum and medium change required	Medium Change Required	Between Medium Change And No Change Required	No Change Required
5. Use of experimental curriculum - amount of change made by teacher at the end of the study (Do not fill in if #4 rated as 5)	Maximum Negative Change	Limited Negative Change	No Change	Limited Positive Change	Maximum Positive Change



**Consultant Rating Scale  
Teacher Change (from Sept. '65 to May '65)**

Teacher \_\_\_\_\_

Consultant \_\_\_\_\_

Aspect of Change

Rating

6. Independence in use of experimental curriculum at the end of the study (i.e., teacher does not need consultant anymore)

Maximum Need /	Between Maximum & Minimum Need /	Medium Need /	Between Medium & No Need /	No Need /
1	2	3	4	5

7. Handling of classroom management problems degree of change necessary at the start of the study

Maximum Change Required /	Between Maximum and Medium Change Required /	Medium Change Required /	Between Medium and No Change Required /	No Change Required /
1	2	3	4	5

8. Handling of classroom management problems amount of change made by teacher at the end of the study (Do not fill in if #7 rated as 5)

Maximum Negative Change /	Limited Negative Change /	No Change /	Limited Positive Change /	Maximum Positive Change /
1	2	3	4	5

9. Independence in handling classroom management problems at the end of the study (i.e., does not need consultant anymore)

Maximum Need /	Between Maximum and Medium Need /	Medium Need /	Between Medium & No Need /	No Need /
1	2	3	4	5

10. Implements consultant's recommendations

Maximum Inappropriate Implementation /	Limited Inappropriate Implementation /	No Approp. Implemen. /	Limited Approp. Implemen. /	Maximum Approp. Imple. /
1	2	3	4	5



**Consultant Rating Scale**  
**Teacher Change (from Sept. '65 to May '67)**

Teacher \_\_\_\_\_ Consultant \_\_\_\_\_

	<u>Rating</u>				
<u>Aspect of Change</u>	1	2	3	4	5
<p><b>11. Incidence of teacher's requests for consultant's assistance (i.e., expression of need for service or support)</b></p> <p>(a) At start of study</p> <p>(b) At end of study</p>	/	/	/	/	/
<p><b>12. Teacher receptivity to consultant's recommendations:</b></p> <p>(a) At start of study</p> <p>(b) At end of study</p>	/	/	/	/	/
	Maximum dis- proportionate to situation	Limited dis- proportionate to situation	None to situation	Limited Proportionate to situation	Maximum Proportionate to situation
	Antagonistic	Skeptical	Indifferent	Cautiously Receptive	Openly Receptive

LESSON OBSERVATION SUMMARY SHEETS (L.O.S.S.)

Teacher \_\_\_\_\_ Date: \_\_\_\_\_ Class # \_\_\_\_\_  
 Consultant \_\_\_\_\_ Time: \_\_\_\_\_ Visit # \_\_\_\_\_

## General Activity

Apparent or Stated Objective:

Instructional Cluster: (Type, membership)

Instructional Material: (A-V, commercial, non-commercial; relatedness to activity, appropriateness for group)

Introduction: (Set, relatedness, clarity, pupil-planning)

Specific Activities: (Type, scope, sequence)

Physical Setup: (Material, seating, light, heat, etc.; diagram of setting, dependent and independent groups)

- a. Teaching Behavior: Ratio of Inductive vs. Non-inductive: (Questions, use of verbal and/or non-verbal cues; reinforcement, type and amount; reassessment of pupil and/or teacher behaviors; restructuring cues and/or behaviors)
- b. Curriculum Content: (Use of Illinois Plan; level and sequence of presentation; attention of physical, social and psychological aspects of skills being taught; intercorrelation of knowledge and social studies areas)
- c. Management of Class: (Approach to distractive behavior and discipline, type and amount; teacher-pupil interaction; pupil-pupil interaction; teacher's voice quality and vocabulary; handling unusual situations, pupil planning)
- d. Conclusion & Follow up: (Summary and/or evaluation; use of group and/or individual appraisal; structured and/or unstructured application; pupil planning)
- e. Management of Pupils Working Independently: (Type of activity; grouping; seating materials; clarity of instruction, follow-up)

Items for Discussion:

Specific Recommendations:

FOE D-016  
OBSERVERS' SUMMARY SHEET (O.S.S.)

Teacher \_\_\_\_\_  
District \_\_\_\_\_  
School \_\_\_\_\_  
Class Number \_\_\_\_\_

Date \_\_\_\_\_  
Time \_\_\_\_\_ to \_\_\_\_\_  
Observer \_\_\_\_\_

I. Time Sample Summary:

	Periods											
	1	2	3	4	5	6	7	8	9	10	11	12
Clock Time												
Instructional Time												
% Instructional Time												
Type of Lesson Observed												

General Observations or Comments:

A. Reading and Language Arts

Group No. Basal Reader Title - Level Publisher

Group No. Workbook Title - Level Publisher

II. Materials Used:

A. Reading and Language Arts (contd.)

Group No. Teacher Made Materials - Describe

Group No. Commercially Prepared Worksheets - Publisher

Group No. Games, kits, and other boxed materials. - Publisher or Company

Group No. Miscellaneous - Describe

B. Arithmetic

Group No. Textbook Title - Level Publisher

Group No. Workbook Title - Level Publisher

Group No. Teacher Made Materials - Describe

Group No. Commercially Prepared Worksheets

Group No. Games, kits, and other boxed materials - Publisher or Company

Group No. Miscellaneous - Describe

C. Science

Description of Materials \_\_\_\_\_

D. Social Studies

Description of Materials \_\_\_\_\_

E. Miscellaneous

Explain \_\_\_\_\_

III. Grouping Technique

<u>Type of Group</u>	<u>Grouping Based On</u>
<input type="checkbox"/> 1. Individual Work ( )	<input type="checkbox"/> 1. Grade Level
<input type="checkbox"/> 2. Small Groups ( )	<input type="checkbox"/> 2. Specific Disability
<input type="checkbox"/> 3. Whole Class ( )	<input type="checkbox"/> 3. Other (Specify)
<input type="checkbox"/> 4. Other (Specify) ( )	

Note: In the parentheses indicate the academic area under observation, i.e., arithmetic, reading, social studies, etc. Use appropriate abbreviations -- A for arithmetic, R for reading, SS for social studies, S for science.

IV. Correlation

Is there evidence of correlation among academic areas, (i.e., language arts with social studies; arithmetic with science, etc.)

Describe:

V. Teaching Techniques

Indicate by checking appropriate level on dichotomy

A. Method:	Rote	Directed	Inductive
Area			
Reading	<input checked="" type="checkbox"/> 1	<input checked="" type="checkbox"/> 2 <input checked="" type="checkbox"/> 3 <input checked="" type="checkbox"/> 4	<input checked="" type="checkbox"/> 5 <input checked="" type="checkbox"/> 6 <input checked="" type="checkbox"/> 7
Arithmetic	<input checked="" type="checkbox"/> 1	<input checked="" type="checkbox"/> 2 <input checked="" type="checkbox"/> 3 <input checked="" type="checkbox"/> 4	<input checked="" type="checkbox"/> 5 <input checked="" type="checkbox"/> 6 <input checked="" type="checkbox"/> 7
Social Studies	<input checked="" type="checkbox"/> 1	<input checked="" type="checkbox"/> 2 <input checked="" type="checkbox"/> 3 <input checked="" type="checkbox"/> 4	<input checked="" type="checkbox"/> 5 <input checked="" type="checkbox"/> 6 <input checked="" type="checkbox"/> 7
Science	<input checked="" type="checkbox"/> 1	<input checked="" type="checkbox"/> 2 <input checked="" type="checkbox"/> 3 <input checked="" type="checkbox"/> 4	<input checked="" type="checkbox"/> 5 <input checked="" type="checkbox"/> 6 <input checked="" type="checkbox"/> 7
B. Learning Atmosphere:	Teacher Dominated	Semi Independent	Child Dominated for Discovery
Area			
Reading	<input checked="" type="checkbox"/> 1	<input checked="" type="checkbox"/> 2 <input checked="" type="checkbox"/> 3 <input checked="" type="checkbox"/> 4	<input checked="" type="checkbox"/> 5 <input checked="" type="checkbox"/> 6 <input checked="" type="checkbox"/> 7
Arithmetic	<input checked="" type="checkbox"/> 1	<input checked="" type="checkbox"/> 2 <input checked="" type="checkbox"/> 3 <input checked="" type="checkbox"/> 4	<input checked="" type="checkbox"/> 5 <input checked="" type="checkbox"/> 6 <input checked="" type="checkbox"/> 7
Social Studies	<input checked="" type="checkbox"/> 1	<input checked="" type="checkbox"/> 2 <input checked="" type="checkbox"/> 3 <input checked="" type="checkbox"/> 4	<input checked="" type="checkbox"/> 5 <input checked="" type="checkbox"/> 6 <input checked="" type="checkbox"/> 7
Science	<input checked="" type="checkbox"/> 1	<input checked="" type="checkbox"/> 2 <input checked="" type="checkbox"/> 3 <input checked="" type="checkbox"/> 4	<input checked="" type="checkbox"/> 5 <input checked="" type="checkbox"/> 6 <input checked="" type="checkbox"/> 7

C. Orientation of teaching materials

Area	Textbook			Combination			Experience		
Reading	/	/	/	/	/	/	/	/	/
	1	2	3	4	5	6	7		
Arithmetic	/	/	/	/	/	/	/	/	/
	1	2	3	4	5	6	7		
Social Studies	/	/	/	/	/	/	/	/	/
	1	2	3	4	5	6	7		
Science	/	/	/	/	/	/	/	/	/
	1	2	3	4	5	6	7		

VI. The Inductive Method

- Yes No 1. Structure (Examples \_\_\_\_\_)
- Yes No 2. Cues (Examples \_\_\_\_\_)
- Yes No 3. Reinforcement (Examples \_\_\_\_\_)
- Yes No 4. Rephrasing (Examples \_\_\_\_\_)
- Yes No 5. Restructuring (Examples \_\_\_\_\_)
- Yes No 6. Opportunity for discovery of generalization (Example \_\_\_\_\_)
- Yes No 7. Summary (Example \_\_\_\_\_)
- Yes No 8. Follow through (Example \_\_\_\_\_)

VIII. Comments and observations related to non-project variables. Type of discipline and management, etc.

Specific Recommendations:

		Teacher		School	
Definition of Problem	Recommendations based upon Supervisor - Teacher Conference	Teacher's Execution of Recommendations	Consultant's and Teacher's Evaluation of Effectiveness of Recommendation	Refinement of Recommendation or New Course of Action	Follow Up On Problem

Response Set

APPENDIX E

Item 5

Name \_\_\_\_\_

Teacher's Name \_\_\_\_\_

Date \_\_\_\_\_

Tester \_\_\_\_\_

Score on 1-10 \_\_\_\_\_

Score on 21-30 \_\_\_\_\_

1. How many hands do you have? \_\_\_\_\_
2. What is the name of this finger? (shows thumb) \_\_\_\_\_
3. What do you do with a pencil? \_\_\_\_\_
4. From what animal do we get milk? \_\_\_\_\_
5. What is your teacher's name? \_\_\_\_\_
6. What do you do with a chair? \_\_\_\_\_
7. What do you do when you are thirsty? \_\_\_\_\_
8. Why do we have stoves? \_\_\_\_\_
9. What is window made of? \_\_\_\_\_
10. What do we do with our eyes? \_\_\_\_\_
11. What's President Johnson's phone number? \_\_\_\_\_
12. Why does the sun shine? \_\_\_\_\_
13. What makes it rain? \_\_\_\_\_
14. Why are there 7 days in a week? \_\_\_\_\_
15. Why does water run down hill? \_\_\_\_\_
16. Why is ice cold? \_\_\_\_\_

-2-  
Response Set

17. Why does the wind blow? \_\_\_\_\_  
\_\_\_\_\_
18. Why is grass green? \_\_\_\_\_  
\_\_\_\_\_
19. What's President Johnson's mother's first name? \_\_\_\_\_  
\_\_\_\_\_
20. What day of the week will Christmas be this year? \_\_\_\_\_  
\_\_\_\_\_
21. What do we do with our ears? \_\_\_\_\_
22. What is a house made of? \_\_\_\_\_
23. What do you do with a telephone? \_\_\_\_\_  
\_\_\_\_\_
24. Why do we have books? \_\_\_\_\_  
\_\_\_\_\_
25. What kind of store do we buy oranges in? \_\_\_\_\_  
\_\_\_\_\_
26. What is the thing to do when you cut your finger? \_\_\_\_\_  
\_\_\_\_\_
27. On what do you sleep? \_\_\_\_\_
28. What do you do when you are hungry? \_\_\_\_\_
29. How many feet do you have? \_\_\_\_\_
30. What is the name of your school? \_\_\_\_\_

APPENDIX E

Item 6

I.R.E.C.

TEST OF BASIC INFORMATION

James W. Moss

Instructions for Administration

Pass out the test booklets and be sure that each child has a soft pencil or crayon and a piece of tagboard about 2" by 8" for a place marker. Have the children put their names on the front cover of the booklets. Where this is not practical the teacher should have the children's names already on the booklets before passing them out.

In the administration of this test the examiner must adhere strictly to the wording of the items. All other instructions to the class except for the actual items may be paraphrased as long as the original meaning is maintained and nothing is added or left out.

The first page of pictures is for practice and demonstration only and is not scored. The object of this page is to provide practice with the test materials and to instruct the children in the method of responding. The examiner should speak slowly, distinctly, and loudly enough to be easily heard by all the children. Test items may be repeated if there is any doubt that the children hear or understand. The test is not timed but should progress as rapidly as practical.

Demonstration Items

The examiner should tell the children to open their booklets to the first page of pictures and fold the booklet back. The examiner should hold her own folded booklet up to demonstrate and make sure that each child is on the appropriate page.

Ask the children to find the kitty at the top of the page and put a mark on it with their crayons. See that everybody does this and look to make sure that the mark is dark enough and well enough placed.

Have the children place their markers under the first row of pictures and make sure that all have them correctly placed.

Say: Look at the first row of pictures. There is a hair pin, a safety pin, a nail, and a paper clip. These are all things you might find around the house. Put a mark on the one made to fasten pieces of wood together.

Ask: "How many put a mark on the picture of a nail?" Say: "Yes, the nail is the one made to fasten wood together." Look to see if all the children made the correct response. If a child marks an incorrect picture, help him to find the right one.

**B. Say: Slide your markers down to the next row of pictures - below the books.  
Put a mark on the heaviest book.**

Make sure that every child has made a mark. The teacher should hold up her own booklet pointing to the last picture in the row as she says: Did you put your mark on this one, the biggest one? Yes, the biggest one is the heaviest one.

**C. Say: Slide your markers down to the next row of pictures. Put a mark on the picture of the thing that could hurt you if you used it wrong.**

Looks to see if everybody has marked the hammer. Ask: Did you all mark the hammer? Yes, the hammer is the one that could hurt you if you used it wrong.

**D. Say: Slide your markers down to the next row of pictures. Put a mark on the baker.**

Ask if everybody marked the picture of a man with a big hat and a cake. Where a child has marked the wrong picture he should be helped to find the right one.

**E. Say: Slide your markers down to the last row of pictures. Put a mark on the picture of the room we wash dishes in.**

Look to see that the children have marked their pictures correctly. Explain the item if any children have marked incorrectly.

\*\*\*\*\*

The children are told that they will now go through the rest of the booklet with as little talking as possible and that no more help will be given. At the beginning of each item, the children are reminded to properly place their markers at the top of a new page or to slide them down.

### TEST ITEMS

Say: Turn the booklet over and find the picture of a baseball at the top. Put a mark on it.

1. Mark the one that measures liquid.
2. Mark the picture of someone who is married.
3. Mark the picture that shows us winter.
4. Put a mark on the one that makes us healthy.
5. Put a mark on the one we measure distance with.

Say: Turn the page and fold the booklet back. Find the bicycle at the top and put a mark on it.

6. Mark the things that are bought most often.
7. Mark the picture that shows where wheat comes from.
8. Mark the narrow line.
9. These are all things we listen to. Mark the musical instrument.
10. Mark the one that makes a signal go off in the fire station.

Say: Turn the booklet over and find the dog at the top. Put a mark on it.

11. Mark the traffic signal that tells you to stop.
12. Put a mark on the one that could burn up. (Emphasize up.)
13. Mark the fastest way to get from Chicago to San Francisco.
14. Here are some squares with coins. Put a mark in the square with seven cents in it.
15. Mark the one that doesn't buy much.

Say: Turn the page and fold the booklet back. Find the apple at the top and put a mark on it.

16. Put a mark on the arrow that tells you to turn right.
17. Mark the coin that is worth two nickels.
18. Mark the arrow that tells you to turn to the left.
19. Mark the picture that shows where oil first comes from.
20. Here are pictures of things that go places. Mark the one that goes the fastest.

Say: Turn the booklet over and find the little car at the top. Put a mark on it.

21. Mark the one that costs the most money.
22. Here are four squares with coins in them. Put a mark in the square that has eleven cents in it.
23. Put a mark on the picture of the thing which makes heat.
24. Mark the one that shows what you might do in December.
25. Mark the picture that shows the best way to get from New York to England.

Say: Turn the page and fold the booklet back. Find the shoe at the top and put a mark on it.

26. Mark the picture that shows what birds first come from.
27. Mark the picture that shows what leather is made from.
28. Mark the picture that shows where electricity is made.
29. Here are some things you might find in different stores. Put a mark on the things you might find in a hardware store.
30. Mark the one that is usually sent first class.

Say: Turn the booklet over and find the clock at the top. Put a mark on it.

31. Mark the sign that says "North".
32. Mark the door that shows the men's washroom.
33. Mark the sign that warns that something may burn you.
34. Put a mark on the sign that tells you not to go in.
35. Mark the sign that says "Road Closed."

Say: Turn the page and fold the booklet back. Find the bird at the top and put a mark on it.

36. Mark the sign that tells a man to put out his cigarette.
37. Mark the sign that tells you where to catch a bus.
38. Mark the sign that would tell your mother where to find apples and oranges in the store.
39. Mark the sign that tells you where to go out.
40. Mark the sign that tells you to be careful.

## APPENDIX F

### Probability Learning Directions

"We're going to play a little game with this box."

"Every time I say ready, you push one of these buttons. Try to make this light (point to light) go on. Push only one button at a time after I say ready."

"Every time you make the light go on, you'll get a chip. When we're all finished, you can trade your chips in for a prize so try to get lots of chips."

Rotate the reinforcement schedules. With the first child, start with block 1 and go through 10. With the second child, start with 2 and go through 1. Do this for all 10 blocks.

Rotate the knob to be reinforced (i.e., A, B, or C). One third should be reinforced on A, another third on B, etc. The first child should be reinforced on A, the second on B, etc.

On the second sheet write the block started with and the knob reinforced. Check the letter for the knob pushed on each of the 100 trials. After testing, make a check mark in front of all trials which were reinforced.

APPENDIX G

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