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**Effects of classroom composition on cognitive and language
development and social behavior of young children with disabilities**

Mills, Paulette Everett, Ph.D.

University of Washington, 1994

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**Effects of Classroom Composition
on Cognitive and Language Development and Social Behavior
of Young Children with Disabilities**

by

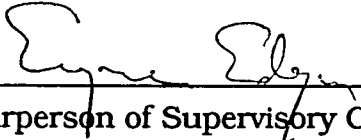
Paulette E. Mills

**A dissertation submitted in partial fulfillment
of the requirements for the degree of**

Doctor of Philosophy

University of Washington

1994

Approved by  _____
(Chairperson of Supervisory Committee)

**Program Authorized
to Offer Degree: Education
Date: 8/2/94**

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Doctoral Dissertation

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Abstract

Effects of Classroom Composition
on Cognitive and Language Development and Social Behavior
of Young Children with Disabilities

by Paulette E. Mills

Chairperson of the Supervisory Committee:

Professor Eugene Edgar
College of Education

This study examined the effects of three different classroom compositions --segregated, integrated special education, and mainstreamed--on the developmental and social behavior outcomes of 66 young children with disabilities. No main effect differences between the three groups appeared on any of the measures. Aptitude-by-treatment analyses revealed that higher performing children gained more in integrated special education settings, whereas lower performing children gained more in segregated and mainstreamed settings. Classroom observations of teacher behavior and children's isolate/unoccupied play provide explanations for the performance of lower performing children with disabilities. Other explanations are suggested to account for the behavior of higher performing children with disabilities. Caution is suggested in pursuing full inclusion as the only placement option for young children with disabilities.

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Introduction

One of the most commonly asked questions in early childhood special education today is: *How can we successfully mainstream children with disabilities?* (Guralnick, 1990a; Salisbury & Vincent, 1990). The evolution of this question from, *Does mainstreaming work?* (Guralnick, 1981a) to its current form has been driven primarily by legislative (federal legislative mandate for least restrictive environments) and philosophical (normalization; Wolfensberger, 1972) rationales. This fairly rapid and widespread acceptance of mainstreaming seems somewhat surprising, however, given the paucity of research demonstrating educational benefits from mainstreaming (Odom & McEvoy, 1988; Lamorey & Bricker, 1993). Despite extensive research on the topic over the past 20 years, there is still uncertainty in the field regarding the effectiveness of mainstreaming (McLean & Hanline, 1990). This uncertainty, however, has not deterred proponents of mainstreaming, who contend that its potential advantages far outweigh any concerns (Allen, 1992). The acceptance of mainstreaming is based on an underlying assumption that it at least does no harm (Cole, Mills, Dale, & Jenkins, 1991). Below, I critically examine mainstreaming research evidence on two outcomes (developmental and social behavior) to determine if mainstreaming is beneficial, or at least benign. My focus is on preschool-age children with disabilities.

Reviews of integration research that focused on developmental outcomes, as measured by standardized tests or measures of rate of development, generally conclude that children with disabilities are not differentially affected by placement in segregated or integrated classrooms (Odom & McEvoy, 1988; Buysse & Bailey, 1993; Lamorey & Bricker, 1993; Mills, 1994). Even the strongest evidence supporting mainstreaming shows mixed results. For example, in a set of three 1-year comparative studies, Cooke, Ruskus, Apolloni, and Peck (1981) found no differences between integrated and segregated programs in the first year but found results favoring integration in the second and third years.

It appears that the expectation that mainstreaming would bring observable benefits influenced how researchers interpreted their findings to some degree. Findings of no difference have been viewed with skepticism. Two other studies, though generally demonstrating no differences, actually found some limited results favoring segregated settings. These findings were interpreted by the authors as artifacts of research confounds: unequal physical therapy treatment outside of class for children in the segregated settings (Jenkins, Speltz, & Odom, 1985) and an increasing curriculum emphasis on language development and higher adult-child ratio in the segregated settings (Fewell & Oelwein, 1990). Thus, research on effects of mainstreaming for developmental behavior have shown, at best, limited benefits of integration. In instances when few or no differences were found (i.e., results contradicted expected findings), researchers tended to explain away the findings by attributing them to confounding variables and weak research design.

Cole's et al. (1991) research may help explain these findings of no benefit of mainstreaming for developmental behavior, as well as explain the problematic findings of actual advantages of segregation over integration. Cole et al. investigated the effects of enrollment in segregated and integrated special education classrooms on children with disabilities who had been randomly assigned to treatment. While there were no significant main effect differences in developmental outcomes for children in the segregated and integrated special education settings, there were aptitude-by-treatment interactions. Children who performed higher on pretest measures benefited more from enrollment in the integrated special education classrooms, while children who performed lower on pretest measures benefited more from enrollment in the segregated classrooms. These findings indicate that the relation of segregated and integrated placements to developmental outcomes may be more complicated than first thought, involving an interaction between the type of placement and child characteristics. Potential explanations for such interactions include the mediating effects of peer models who may have influenced the development of cognitive and language skills for children with more mild disabilities, and the mediating effects of

teachers who may have used more complex and fast-paced instruction in the integrated classrooms to keep the attention of the typically developing children. It is possible that aptitude-by-treatment interactions may have been present and may explain the findings of no differences in developmental measures in earlier studies of mainstreaming (Jenkins, Odom, & Speltz, 1989; Harris, Handleman, Kristoff, Bass, & Gordon, 1990; Rule et al., 1987).

In the area of social development, mainstreaming yields a slightly more positive picture, although even for this area, research outcomes have been far from conclusive. Several reviewers have concluded that social integration may occur naturally for some children with mild disabilities, but requires intervention for children with moderate to severe disabilities (O'Connell, 1984; Guralnick, 1990b; Odom & McEvoy, 1988; Buysse & Bailey, 1993). Other reviewers are more cautious and conclude that positive social behavior outcomes are under the control of mediating variables that are not necessarily inherent in either segregated or integrated placements. Examples of such mediating variables are: the use of structured or organized interventions (Lamorey & Bricker, 1993), quality and quantity of teacher attention (Lamorey & Bricker, 1993; Mills, 1994), adult-child ratio, and types of disabilities (Mills, 1994).

Thus in response to the question, *Does preschool mainstreaming work?*, research indicates that it doesn't necessarily help a great deal, but it doesn't seem to hurt significantly either. The results of the Cole et al. (1991) study suggest the beneficial or harmful effects of mainstreaming are dependent on an interaction between degree of disability and type of placement. This finding should cause educators to question the use of mainstreaming as the *only* appropriate model for *all* children.

The current movement to provide mainstreaming for all children (Fuchs & Fuchs, 1994), perhaps without an adequate knowledge base to guide the process, has led Bricker, Peck, and Odom (1993) to identify three dilemmas in providing effective integration. The first problem arises from competing values between those who zealously advocate for education totally within the regular education settings for all children with disabilities (inclusion model) (Salisbury, 1991), and those who

advocate for a wider array of choices (Fuchs & Fuchs, 1994). Bricker et al. propose that this problem is best addressed by giving parents and professionals a choice of placements; for example, they support a continuum of services for children with disabilities and their families. They also encourage continued research on the effects of various levels of integration. The second problem is the movement of research emphasis away from evaluating the effectiveness of mainstreaming to identifying factors which promote successful mainstreaming. Bricker et al. support the idea of increasing the sophistication of research by concentrating on a variety of methods such as single-subject or comparative designs. The third problem is the lack of research which identifies and investigates critical context variables associated with different types of classroom compositions. Bricker et al. suggest that researchers need to expand their investigations and study outcomes on more than one variable in a given context in order to better inform the field of the potential for interaction between important factors.

I agree with Bricker et al. that variations in mainstreaming formats must continue to be examined and that full "inclusion" may not necessarily be best for all children. It seems preferable that program decisions should be data-based. The purpose of this study was to examine the relative effects of three types of classroom composition on both developmental and social outcomes of preschool children with disabilities.

Consistent with Bricker's et al. first recommendation to offer a continuum of services, the present study examined the effects of three different levels of integration--segregation (classrooms which enroll only children with disabilities), integrated special education (more children with disabilities than typically developing children), and mainstreaming (typically developing children are equal to or outnumber the children with disabilities)--on the developmental and social behavior outcomes of young children with disabilities. It is also responsive to the Bricker et al. recommendation for stronger research designs. I employed a between-subjects comparative study with matched subjects. Finally, the present study responds to Bricker's et al. recommendation for identification, investigation, and control of critical variables. I did this in three ways:

(1) I controlled variables such as adult-child ratio, group size, classroom schedules, activities, and common program administration; (2) I collected data across three years in which the treatments sampled the contributions of three different curriculum approaches and an average of five different teachers for each level of treatment; and (3) I assessed both developmental (cognitive and language) and social behavior outcomes.

The questions addressed in this research were:

- (1) Does enrollment in mainstreamed, integrated special education, and segregated programs have differential effects on cognitive and language development measures?
- (2) Does enrollment in mainstreamed, integrated special education, and segregated programs have differential effects on social behavior measures?
- (3) Does the pretest performance level on developmental measures affect outcome measures differentially for mainstreamed, integrated special education, and segregated classrooms?
- (4) What is the relationship between the developmental measures and the social interaction measures, and does this relationship help explain the results?

Method

Subjects

A total of 66 children, ages 31 to 75 months ($M=53.26$, $SD=11.23$) participated in this study. These children qualified for special education under Washington State's noncategorical system of funding for preschool children. Children qualify for special education if they exhibit a delay of at least 1.5 standard deviations on a normed test in two or more developmental areas (gross motor, fine motor, language, cognition, or social/emotional development) or if they exhibit a delay of 2 or more standard deviations in any one of these areas. Approximately 46 of the students exhibited a significant delay (.5 standard deviations or higher) in gross motor (70%), 55 in fine motor (83%), 55 in language (83%), 36 in cognition (54%), and 56 in social/emotional development (85%). The sample contained 49 boys (74%) and 17 girls (23%), with an ethnic mix of 45 Caucasian (68%), 13 African-American (20%), and 8 Asian, Native American, Pacific Islander, or Other (12%).

In addition, 51 typically developing children were enrolled in integrated and mainstreamed classrooms. These children, ages 32 to 65 months ($M=47.51$ months, $SD=7.88$), contained 31 boys (61%) and 20 girls (39%), representing an ethnic mix of 39 Caucasian (77%), 9 African-American (18%), and 2 Asian, Native American, Pacific Islander, or Other (4%). For this group, the General Cognitive Index (GCI) mean was 104.61 ($SD=15.28$) as measured by the McCarthy Scales of Children's Abilities, and the Preschool Language Assessment Instrument (PLAI) mean for totally appropriate responses was .62 ($SD=.20$). Only the data on children with disabilities are reported in the remainder of this thesis.

Final sample selection

The original data set included 114 children with disabilities, but the number of children with disabilities who had been randomly assigned to the three types of treatment (i.e., classrooms) ranged from 22 in the mainstream condition to 48 in the segregated condition. For purposes of this study, I created equal sample sizes by selecting a subsample of children from the integrated special education and segregated programs ($N = 22$ each) to match the total number of students in the

mainstreaming condition. I used the PLAI pretest scores for total appropriate responses to match subjects in the three treatments. Thus, there were no significant differences between groups on any pretest measure.

Design

This experiment examined outcomes related to three levels of a single factor, classroom composition. Children were randomly assigned to one of three classroom compositions (segregated, integrated special education, or mainstreamed) differing in the proportion of children with disabilities to the total. Each classroom enrolled 14 children.

Mainstreamed classrooms each enrolled 9 typically developing children and 5 children with disabilities. The integrated special education classrooms enrolled 3 typically developing children and 11 children with disabilities. Segregated classrooms enrolled 14 children with disabilities and no typically developing children.

Data collection for this study extended over a three-year period during which time all three types of classrooms were represented each year. Children attended preschool for 2 hours and 15 minutes per day, five days a week, for 180 school days. Classrooms representing each level of integration met in the morning, and another set met in the afternoon. Over the three-year period, four different teachers taught the mainstreamed, five taught the integrated special education, and four taught the segregated classrooms.

Although some children participated in the school program for more than one year, I used only data from their first year in the research project. See Table 1 for descriptive statistics associated with the three classroom compositions.

Curricula

In the first two years of the project each classroom used one of two curricula. Five of the six classrooms used the Mediated Learning (ML) Curriculum (Osborne & Sherwood, 1984) and one of the segregated classrooms used the Direct Instruction (DI) program as developed by Engelmann and his colleagues (Becker, 1977; Becker, Engelmann & Thomas, 1975). Due to the implementation of another research project in the third year of this project, curricula changed. At that time, one

classroom representing each level of classroom composition used a direct language curriculum (Waryas & Stremel-Campbell, 1983), and the other three classrooms used Enterprise, an interactive language curriculum (Drummond, 1989).

Each classroom had the same staffing pattern: a head teacher with a Master's degree in special education, an assistant teacher, a practicum student, and related service personnel (CDS, OT, PT) who provided services in the classroom during segments of the school day. On average, three adults were in each classroom.

Measures

McCarthy Scales of Children's Abilities (MSCA). The MSCA (McCarthy, 1972) is an individually administered intelligence test for children ranging in age from 2-1/2 to 8-1/2. Subtests include Verbal, Perceptual, Quantitative, Memory, Motor, and the General Cognitive Index (GCI), composed of a combined set of the subsets. The GCI has an average split-half reliability of .93. I obtained complete pre- and posttesting results for 64 of 66 children on this measure.

Preschool Language Assessment Instrument (PLAI). The PLAI (Blank, Rose, & Berlin, 1978) is an experimental test designed to measure children's ability to respond to increasingly difficult and abstract language, similar to that encountered in teaching situations. The test was normed on children between the ages of 3 and 6. Four distinct levels of abstraction, in ascending order of difficulty, were: (1) Matching Perception (e.g., What do you see?), (2) Selective Analysis of Perception (e.g., What is different?), (3) Reordering Perception (e.g., How can you tell?), and (4) Reasoning About Perception (e.g., What will happen?). We obtained complete pre- and posttest results for 65 children on this test.

The California Preschool Scale of Social Competence (CPSSC). The CPSSC (Levine, Elzey, & Lewis, 1969) is a teacher rating scale used to measure the social competence of children aged 30 through 66 months. The test consists of 30 items, each with four descriptive statements which represent different levels of competence. Teachers select the best response for each item for each child (e.g., Item 23, Dependence Upon Adults: He will continue in an activity on his own

without having an adult participate with him or encourage him: (1) Hardly Ever; (2) Sometimes; (3) Frequently; (4) Nearly Always). Interjudge reliability coefficient range was from .76 to .79 and odd-even reliability coefficients range was from .90 to .98. This information was available on all 66 children in the sample.

Social Interaction Scan (SIS). The SIS (Odom et al., 1988) is a point-scan observation system. An observer watches a child for two seconds, records the child's behavior, and then finds the next child on the randomized list, observes that child, etc., until all of the children have been observed no more than 10 times on any given day. Nine categories of social behavior are recorded:

- (1) teacher interaction (TC)--child initiates to the adult (verbal or nonverbal)
- (2) teacher interaction (TT)--teacher initiates to the child (verbal or nonverbal)
- (3) teacher interaction (TCT)--teacher and child interact with each other (verbal or nonverbal)
- (4) interactive play (IH)--positive interaction with peer who has a disability (verbal or nonverbal)
- (5) interactive play (IN)--positive interaction with a peer who is typically developing (verbal or nonverbal)
- (6) negative interactive play (NH)--negative interaction with a peer who has a disability (hostile, aggressive, or rejecting; verbal or nonverbal)
- (7) negative interactive play (NN)--negative interaction with a peer who is typically developing (verbal or nonverbal)
- (8) proximity play (P)--child does not interact but is playing within three feet of another child
- (9) isolate/unoccupied (I/U)--child plays alone (more than three feet away from others) or is not engaged in any play activity (may or may not be within three feet of another child).

Reliability on the observations is calculated by dividing the number of agreements on the occurrence of a particular category by the total number of agreements plus disagreements.

The number of total observations per child varied (from 30 to 100) for the 66 children in the sample. The first 97 observations were used for each child. Eighteen children had fewer than 97 observations, thus reducing the sample size for this analysis to 48 children.

Testing Procedures

The McCarthy and PLAI were administered as pre- and posttests between October and May. At least six months passed between each pretest and posttest.

The SIS observations were gathered primarily between March and June. Observers were trained to at least 80% reliability in each classroom before data collection. Inter-observer reliability was then gathered on approximately 20% of the observations each year. The final reliability averaged 80.7%, with a range of 54%-95% on individual samples.

A research staff consisting of undergraduate psychology students and graduate students in speech language pathology, special education, and psychology conducted all observations and tests. Classroom teachers provided the CPSSC ratings between March and June.

TABLE 1: Description of Subjects for Each Level of Integration.

	Segregated		Integrated Special Education		Mainstreamed	
N	22		22		22	
Age	51.77 mos.		52.05 mos.		55.95 mos.	
Range	36-72 mos.		36-70 mos.		31-75 mos.	
	N	Percent	N	Percent	N	Percent
Gender						
Boys	17	77	16	73	16	73
Girls	5	23	6	27	6	27
Ethnicity						
Caucasian	14	64	13	60	18	82
African-American	4	18	7	31	2	9
Other	4	18	2	9	2	9

Results

Pretest Performance

Table 2 shows the means and standard deviations of pretest measures for the three classroom composition groups. To determine the success of matching in forming comparable groups, one-way analyses of variance (ANOVAS) were performed on the McCarthy GCI, verbal, perceptual, quantitative, and memory scale scores and on the PLAI number of total appropriate responses. None of the pretest means differed significantly for the three types of classrooms (all p 's $> .05$).

Pre- to Posttest Change

Class composition means and standard deviations on the McCarthy and PLAI pretests and posttests are reported in Table 2. For the McCarthy Scales and the PLAI, repeated-measures ANOVAs were performed with class composition as a between-subjects factor, and time (pretest to posttest) as a within-subjects factor. Time was significant for the McCarthy GCI, $F(1, 61)$, $p < .05$, and for the PLAI, $F(1, 62)$, $p < .001$, with posttests significantly higher than pretests. The McCarthy Verbal scale was close to significant for time ($p < .07$). The critical interaction of class composition \times time of test did not reach significance for any of the McCarthy or PLAI measures.

Aptitude-by-Treatment Interaction Outcomes

Aptitude-by-treatment interaction effects were examined via multiple regression analyses. Pretest ability, class composition, and ability-by-composition terms were tested for each dependent measure: the McCarthy subscales and the PLAI total appropriate responses. Because of the complexity of the aptitude-by-treatment interactions, I conducted pairwise comparisons of the groups (Abbott, personal communication, 1992); that is, mainstreamed versus integrated special education; segregated versus integrated special education; and segregated versus mainstreamed. In each analysis, age and the relevant pretest were entered first, followed by the composition variable, followed by the interaction of composition and pretest. This process was completed twice: once using McCarthy GCI and again using PLAI as a pretest measure. The analyses are summarized in Table 3. A total of 36

analyses were computed resulting in nine significant aptitude-by-treatment interactions (see Figures 1-9).

Integrated Special Education vs. Mainstreamed. This pair of treatments entered into five significant interactions with the pretest ability measure. Classroom composition (mainstreamed and integrated special education) interacted with the PLAI pretest score on four posttests: McCarthy verbal ($p < .01$), quantitative ($p < .05$), memory ($p < .01$), and GCI ($p < .05$) scale scores. In addition, this pair of treatments interacted with the McCarthy pretest GCI on posttest McCarthy memory ($p < .05$) scales. The direction of the interactions was the same for all five aptitude-by-treatment interactions: higher performing students with disabilities at pretest gained more in integrated special education, and lower performing students with disabilities at pretest gained more in mainstreamed classes.

Segregated vs. Integrated Special Education. This classroom composition interacted with four pretest ability measures: the PLAI pretest on the McCarthy verbal ($p < .01$), quantitative ($p < .01$), and memory ($p < .01$) posttest scale scores; and McCarthy pretest GCI on the McCarthy posttest quantitative scale score ($p < .05$). The direction of the interaction for all four aptitude-by-treatment interactions indicated that higher performing students at pretest gained more from the integrated special education classes, whereas lower performing students gained more from the segregated classes.

Segregated vs. Mainstreamed. No significant interactions with the pretest ability measure were found.

Summary of Aptitude-by-Treatment Intervention Analyses.

All of the aptitude-by-treatment interventions indicated that higher performing students at pretest gained more from the integrated special education classes, whereas lower performing students gained more from the segregated or mainstreamed classes.

The Johnson-Neyman procedure (as reported in Pedhazur, 1982) was used to determine the region of non-significance for each pair of regression lines. The region is indicated on each graph. It appears that significant differences between the lower performing students in the integrated and segregated (or mainstreamed) classrooms did not emerge

in the range of scores observed. The numbers indicated for the lower end of the region are not possible for the tests reported: for example, the McCarthy Scales do not go below 50, but the region of significance goes below 29. The differences between the higher performing students in the integrated special education as compared to the segregated or mainstreamed classrooms were, however, significant. While the interactions are significant, the impact is greater on the performance of the higher performing children than the lower performing children.

Social Measures

Table 4 gives CPSCS scores by class composition. The analysis of variance scores indicated no significant differences between classroom compositions.

Table 5 gives the means and standard deviations for the SIS frequencies. One-way ANOVAs followed by Tukey's Honestly Significant Difference test were performed on each SIS individual and combined measure. (See Figure 10 for a comparison of means across classroom composition.) On the SIS, no significant differences were noted for any of the teacher-child interaction variables (TT, TC, TCT), the proximity measure (P), or the isolate/unoccupied (I/U) measures. In order to evaluate the combined total of teacher attention in each classroom composition (TT + TC + TCT), another variable was compiled and analyzed. No significant differences were noted for the combined teacher attention variable.

In contrast, the categories which measure peer interaction revealed significant differences. Compared to children with disabilities in mainstreamed classrooms, those in integrated special education and segregated classrooms had more positive interaction with other peers with disabilities (IH), $F(2,63) = p < .05$. Children with disabilities interacted negatively with typically developing peers (IN) significantly more in mainstreamed classes than in integrated special education classes, $F(2,63) = p < .05$.

Due to the different proportion of children with disabilities to typically developing children in the integrated special education classrooms (11 with disabilities, 3 typical) and mainstreamed classrooms (5 with disabilities, 9 typical), chi square analyses of the proportion of

interaction expected and observed in the different classrooms were computed. These analyses revealed no significant difference between the balance of interaction that was expected between typically developing children and children with disabilities in either of these two classroom compositions. Thus the greater interaction in the mainstream classrooms of children with disabilities with typically developing children appears to be due to the greater number of typically developing children available in the mainstreamed classrooms, rather than to a different dynamic operating in these classrooms.

Children with disabilities interacted negatively (IN) with other children with disabilities significantly more in integrated special education classes than in mainstreamed classes. Though not significant, the number of negative interactions in the segregated classrooms is also higher than that in the mainstreamed classrooms. A chi square analysis of the expected proportion of negative interactions across the three classroom compositions was performed to determine any degree of disproportion. No significant differences were indicated. The greater number of negative interactions in the integrated special education setting as compared to the mainstreamed settings appears to be due to the greater number of children with disabilities available for interaction in the integrated special education classrooms.

In order to evaluate the combined total of peer interaction in each classroom composition, three composite variables were compiled and analyzed: (1) the total of positive interactions (IH + IN) with typically developing children and children with disabilities; (2) the total of negative interactions with typically developing children and children with disabilities (NH + NN); and (3) the total of all positive and negative interactions (IH + NH + IN + NN). No significant differences were found among class compositions on any of these three variables.

The social behavior of typically developing children and children with disabilities was compared using t-tests. Typically developing children were significantly ($M=.28$, $p < .001$) more interactive with peers and received significantly less teacher attention ($M=.16$, $p < .001$) than children with disabilities. Further t-test analyses comparing typically developing children in integrated special education and mainstreamed

classrooms revealed that typical children played significantly more with other typical children in mainstreamed classrooms ($p < .05$), and significantly more with children with disabilities in integrated special education classrooms ($p < .001$). Chi square analyses revealed no significant differences in the proportions of interactions in either classroom type.

Relationship Between Social Observations and Formal Test Measures

Table 6 provides a correlation matrix showing the relationship between social observation measures (some separate and combined) and performance on formal test measures. Based on this information two additional analyses were performed.

Because children's composite score of positive and negative social interaction was significantly correlated with the PLAI pretest measure, I explored the possibility that an individual's level of social interaction might explain the pattern of aptitude-by-treatment interactions observed for different combinations of classroom composition. I computed additional multiple regression analyses in which level of social interaction was entered before the interaction term. This process did not change the result of any of the aptitude-by-treatment interaction analyses; all seven analyses involving the PLAI remained significant. Thus it would appear that the amount of social interaction does not explain the academic performance differences.

The rate of isolate/unoccupied play was the only other social observation variable which correlated significantly with any of the pretest measures. The correlations were all negative and significant. In an attempt to explain the pattern of aptitude-by-treatment interactions found in the initial regression analyses, I explored the effect lack of social interaction might have on children's test performance.

Using isolate/unoccupied as the dependent variable, I computed a 3 X 2 ANOVA where children from the 3 classroom compositions were divided into 2 groups (high and low) according to their GCI. This analysis examines the relationship between isolation and performance on pretest measures. The midpoint of the region of significance, using the pretest McCarthy GCI as the predictor, was used to divide children into groups. Since the midpoint ranged between 40 and 48, and the

McCarthy GCI does not give a scale score below 50, children who obtained inadequate McCarthy GCI basal scale scores ($GCI < 50$), and were therefore clearly more than 3 SDs below the mean, made up one group (lower performing children with disabilities, $N = 15$). Children whose McCarthy GCI was above the midpoint of the region of significance in the aptitude-by-treatment interaction ($GCI > 49$) made up the other group (higher performing children with disabilities, $N = 33$).

Considering the scores in the two extremes, the main effects for both GCI ($F = 30.28 [1,47], p < .001$) and level of integration ($F = 5.13 [2,47], p < .01$) were highly significant. The interaction was also quite significant ($F = 5.96 [2,42], p = .005$). (See Figure 11.) The lower performing children with disabilities were significantly more isolated than the higher performing children with disabilities in all classroom compositions, and were significantly more isolated from their peers in the integrated special education classrooms than in either the mainstreamed or segregated classrooms. The higher performing children with disabilities showed some differences in their isolated/unoccupied behavior across conditions. Higher performing children with disabilities were less isolated in the segregated classrooms, somewhat more isolated in integrated special education classes, and even more isolated in mainstreamed classes (twice as much as in the segregated classes). It would appear that the relationship between isolation and level of integration was most pronounced for the lower performing children with disabilities, and showed a somewhat different pattern for higher performing children with disabilities than lower performing children with disabilities. Perhaps there are different variables at work in explaining the differences between the two groups.

Two other analyses were performed to further investigate possible explanations for the discrepancy between the performance of higher performing and lower performing children with disabilities. The dependent variables of teacher attention and social interaction/proximity with peers (combined measure of total social interaction with peers and proximity indicating nearness to peers) which showed a significant relationship with each other in a negative direction, were each analyzed separately using a 2×3 ANOVA, two performance levels as

determined by GCI, and three classroom compositions. For teacher attention there were no main effect differences and no significant interactions, though there was an indication of a slight increase in teacher attention for lower performing children enrolled in integrated special education classrooms (see Figure 12). The combined measure of social interaction with and proximity to peers (measure of nearness to peers and opposite to the isolation/unoccupied behavior) showed significant main effect for GCI, $F(1,47) = 4.89, p < .05$, and close to significant for class composition, $F(1,47) = 1.83, p = .17$, and for the interaction term, $F(2,42) = 2.21, p = .12$. As expected, this combined measure looks like a mirror image of the isolated/unoccupied measure (see Figure 13). Very little overall change is noted for the higher performing children while there is a significant drop in interaction and proximity to peers for the lower performing children in the integrated special education classrooms.

TABLE 2: Repeated Measures ANOVAS on McCarthy Scales and PLAI.

	Pre	Post	
McCarthy			
GCI Segregation	67.05 (19.78)	74.14 (28.32)	
Integration	67.73 (20.26)	75.18 (23.65)	
Mainstreamed	64.91 (16.52)	65.33 (16.16)	
Time			F=6.01(1,61), p<.02
Interaction			F=1.25 (2,61), n.s.
Verbal			
Segregation	33.95 (10.69)	34.33 (12.20)	
Integration	31.45 (11.22)	36.41 (13.05)	
Mainstreamed	30.09 (9.84)	30.14 (9.60)	
Time			F=3.47(1,61), n.s.
Interaction			F=2.74(2,61), n.s.
Perceptual			
Segregation	31.57 (11.24)	33.19 (12.05)	
Integration	33.68 (11.89)	36.36 (14.47)	
Mainstreamed	33.48 (10.15)	33.76 (9.54)	
Time			F=3.49(1,61), n.s.
Interaction			F= .72(1,61), n.s.
Quantitative			
Segregation	33.91 (9.59)	32.91 (11.39)	
Integration	35.50 (12.73)	37.82 (13.85)	
Mainstreamed	32.00 (9.19)	32.95 (9.89)	
Time			F= .64(1,61), n.s.
Interaction			F=1.05(1,61), n.s.
Memory			
Segregation	34.38 (11.27)	34.05 (13.19)	
Integration	34.64 (10.44)	37.64 (15.65)	
Mainstreamed	32.38 (9.21)	30.00 (10.20)	
Time			F= .01(1,61), n.s.
Interaction			F=2.23(1,61), n.s.
PLAI			
Total Appropriate			
Segregation	.31 (.27)	.44 (.20)	
Integration	.33 (.26)	.44 (.24)	
Mainstreamed	.31 (.26)	.37 (.25)	
Time			F=31.81(1,62), p<.000
Interaction			F= 1.58(2,62), n.s.

TABLE 3: Summary of Aptitude-by-Treatment Multiple Regression Analyses for Students in Segregated, Integrated Special Education, and Mainstreamed Settings.

Pretest measure	Posttest measure	ISE vs. Mainst.	Seg. vs. ISE	Seg. vs. Mainst.
PLAI	McCarthy Verbal	p<.01*	p<.01*	N.S.
	McCarthy Quantitative	p<.05*	p<.01*	N.S.
	McCarthy Memory	p<.01*	p<.01*	N.S.
	McCarthy GCI	p<.05*	N.S.	N.S.
	McCarthy Perceptual	N.S.	N.S.	N.S.
	PLAI	N.S.	N.S.	N.S.
McCarthy GCI	McCarthy Verbal	N.S.	N.S.	N.S.
	McCarthy Quantitative	N.S.	p<.05*	N.S.
	McCarthy Memory	p<.05*	N.S.	N.S.
	McCarthy GCI	N.S.	N.S.	N.S.
	McCarthy Perceptual	N.S.	N.S.	N.S.
	PLAI	N.S.	N.S.	N.S.

* The direction of the slope is highest for ISE.

ISE = Integrated Special Education

Mainst. = Mainstreamed

Seg. = Segregated

McCarthy = McCarthy Scales of Children's Abilities

PLAI = Preschool Language Assessment Instrument

TABLE 4: Means and Standard Deviations for the California Preschool Social Competency Scale.

	Means	SD
Raw Score		
Segregated	72.07	(22.21)
Integrated Special Ed.	67.72	(20.95)
Mainstreamed	68.00	(18.26)
Scale Score		
Segregated	24.89	(22.87)
Integrated Special Ed.	17.18	(22.37)
Mainstreamed	19.64	(24.27)

TABLE 5: Mean Frequencies (Standard Deviations) for Children with Disabilities for the Social Interaction Scan Categories.

			Means	SDs
Child initiates to Teacher	TC	Segregated	.03	(.02)
		Integ. Sp. Ed.	.04	(.03)
		Mainstreamed	.03	(.03)
Teacher initiates to Child	TT	Segregated	.06	(.04)
		Integ. Sp. Ed.	.07	(.04)
		Mainstreamed	.08	(.05)
Teacher-child interaction	TCT	Segregated	.12	(.07)
		Integ. Sp. Ed.	.11	(.05)
		Mainstreamed	.10	(.06)
Teacher/child combined	TC+TT+TCT	Segregated	.21	(.09)
		Integ. Sp. Ed.	.22	(.09)
		Mainstreamed	.21	(.09)
Proximity	P	Segregated	.54	(.11)
		Integ. Sp. Ed.	.45	(.13)
		Mainstreamed	.50	(.11)
Isolate/Unoccupied	I/U	Segregated	.07	(.06)
		Integ. Sp. Ed.	.10	(.08)
		Mainstreamed	.12	(.06)
+ Interaction with Disabled	IH	Segregated	.17	*(.07)
		Integ. Sp. Ed.	.16	*(.10)
		Mainstreamed	.04	(.02)
+ Interaction with Typical	IN	Segregated	.00	(.00)
		Integ. Sp. Ed.	.05	(.06)
		Mainstreamed	.13	*(.09)
- Interaction with Disabled	NH	Segregated	.01	(.01)
		Integ. Sp. Ed.	.02	*(.02)
		Mainstreamed	.003	(.006)
- Interaction with Typical	NN	Segregated	.00	(.00)
		Integ. Sp. Ed.	.002	(.005)
		Mainstreamed	.005	(.007)

TABLE 5, Continued

		Means	SDs
+ Interaction with Disabled & Typical	IH+IN	Segregated	.18 (.07)
		Integ. Sp. Ed.	.21 (.12)
		Mainstreamed	.16 (.10)
- Interaction with Disabled & Typical	NH+NN	Segregated	.01 (.001)
		Integ. Sp. Ed.	.02 (.02)
		Mainstreamed	.01 (.01)
Total of All Interactions	IH+IN+NH+NN	Segregated	.19 (.07)
		Integ. Sp. Ed.	.23 (.13)
		Mainstreamed	.17 (.10)

* $p < .05$

Note: Total N for these analyses is 48

Segregated, N = 16

Integrated Special Education, N = 13

Mainstreamed, N = 19

TABLE 6: Correlation Matrix of Relationships Between Pretest Measures and Social Measures.

McCarthy	Pp	Q	M	GCI	PLAI	CA	P	I/U	TOT	T/C	P/TOT
Verbal (V)	.65***	.71***	.77***	.88***	.51***	.29	.07	-.39**	.12	.08	.17
Perceptual (Pp)		.69***	.67***	.87***	.39**	.30	.04	-.29**	.14	.04	.16
Quantitative (Q)			.86***	.86***	.39**	.22	-.04	-.38**	.12	.24	.06
Memory (M)				.84***	.41**	.16	-.01	-.38**	.14	.16	.13
GCI					.47**	.29	.05	-.35*	.11	.12	.14
PLAI						.22	.06	-.29*	.31*	-.27	.34**
CPSCS (CA) SIS							.16	-.37	.30	-.24	.42***
Proximity (P)								-.36*	-.45**	-.50***	.62***
Isolate/unoccupied (I/U)									-.33*	-.09	-.65***
Peer interaction total (TOT)										-.31*	.42**
Teacher/Child interaction (T/C)											-.78***

Note: P/TOT = Proximity/Peer Interaction. * p < .05; ** p < .01; *** p < .001

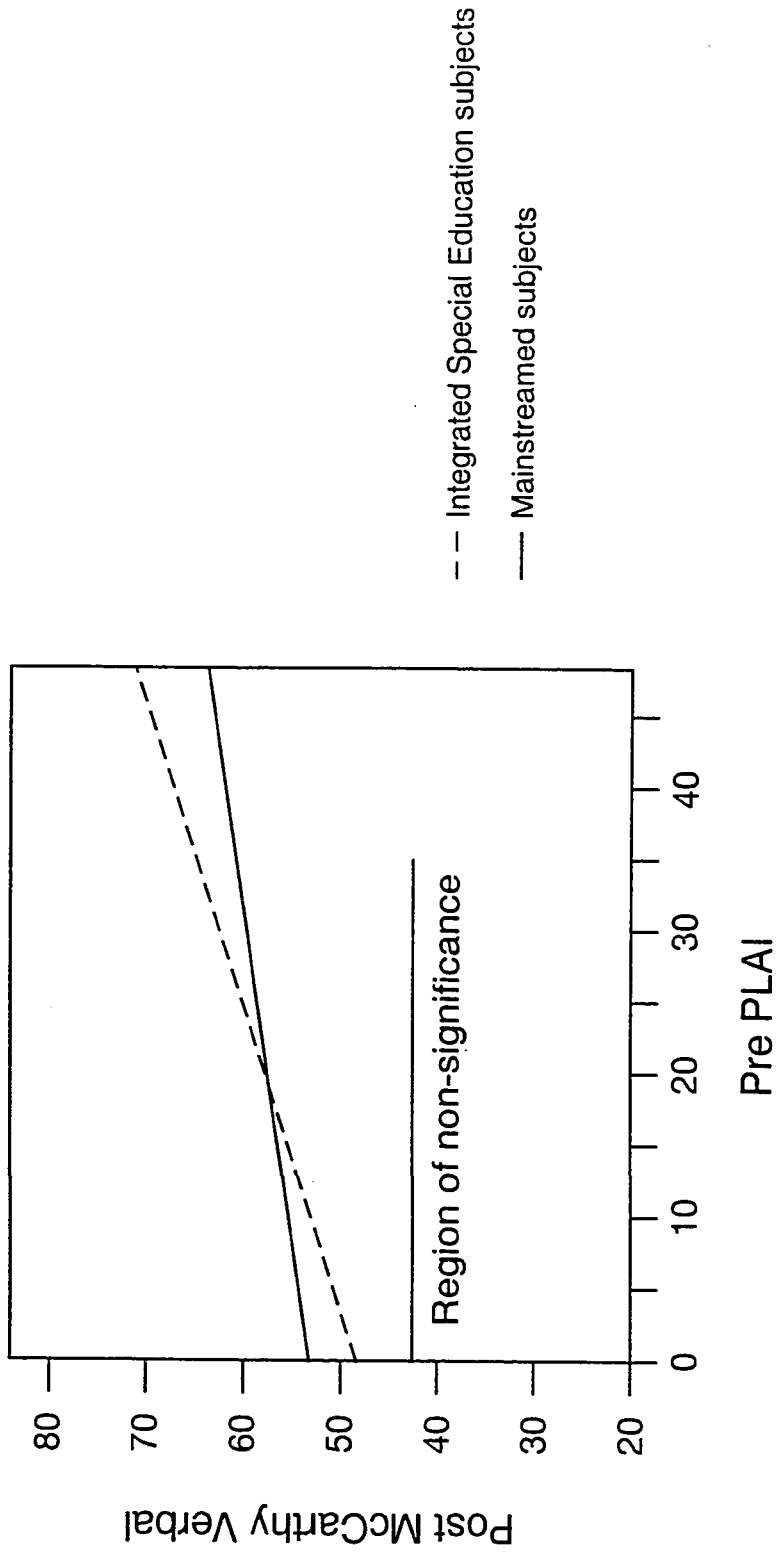


Figure 1: Pretest PLAI Appropriate Responses as a Predictor of Posttest McCarthy Verbal Scale Score for Integrated Special Education and Mainstreamed Conditions

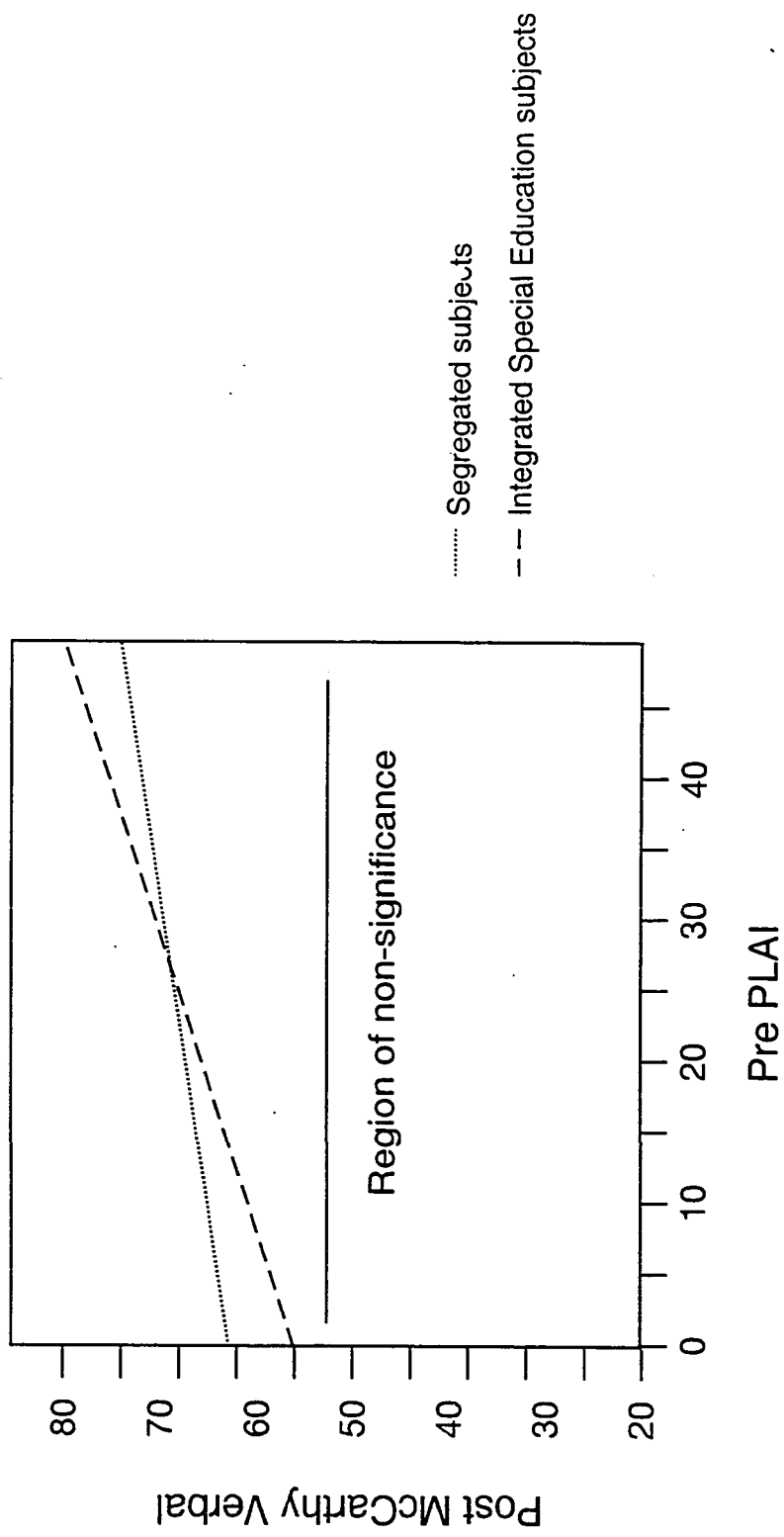


Figure 2: Pretest PLAI Appropriate Responses as a Predictor of Posttest McCarthy Verbal Scale Score for Segregated and Integrated Special Education Conditions

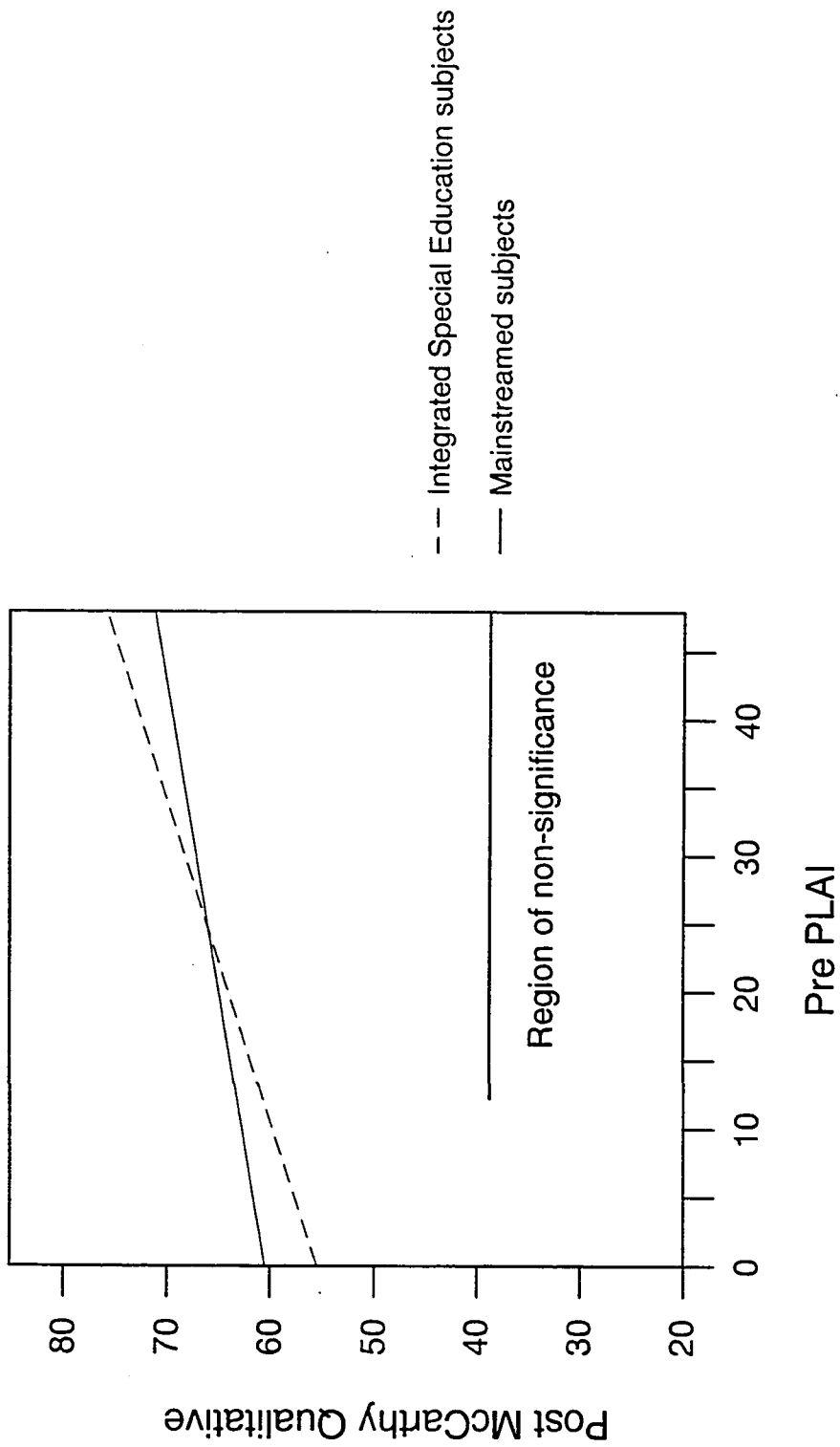


Figure 3: Pretest PLAI Appropriate Responses as a Predictor of Posttest McCarthy Quantitative Scale Score for Integrated Special Education and Mainstreamed Conditions

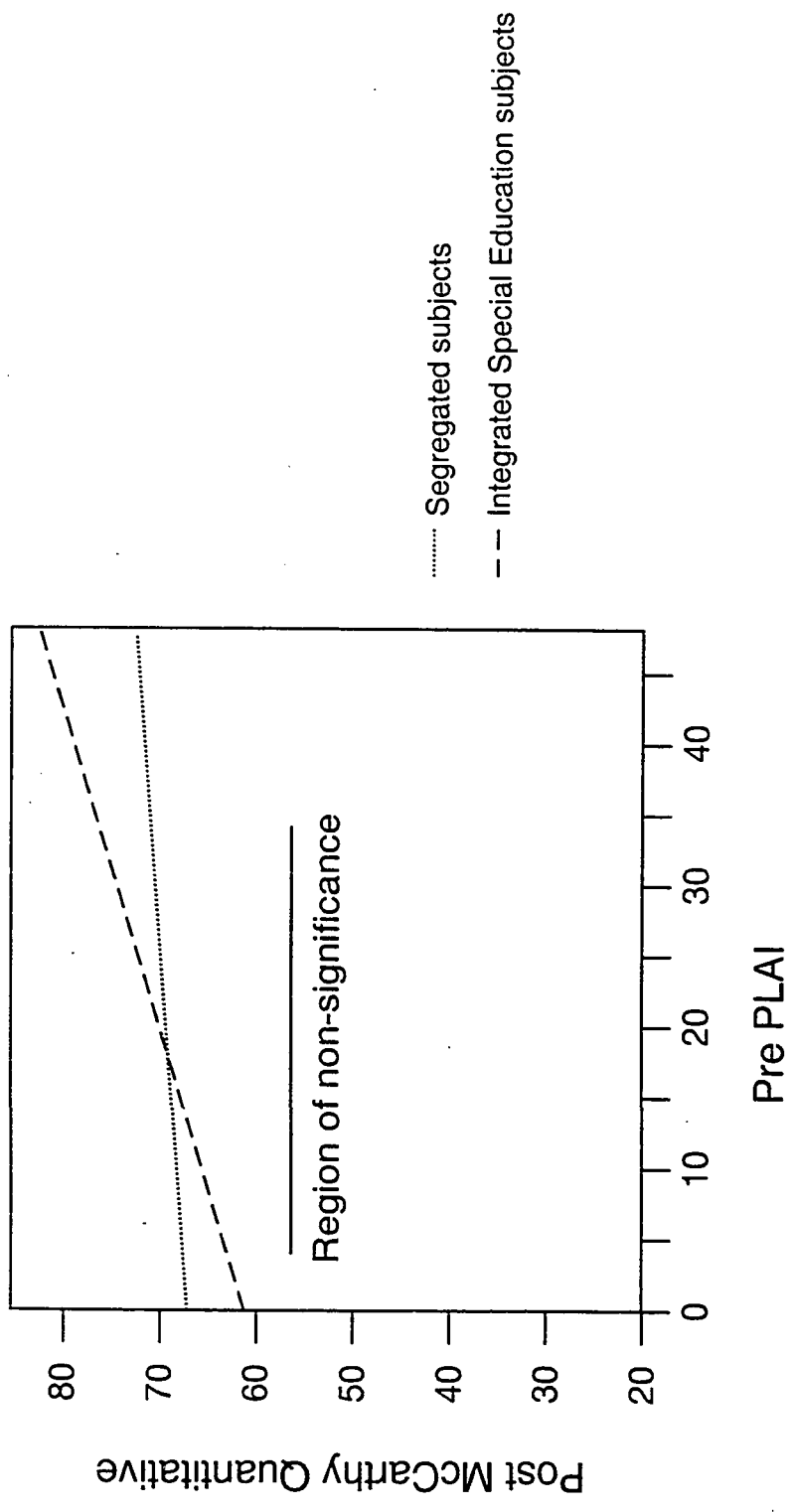


Figure 4: Pretest PLAI Appropriate Responses as a Predictor of Posttest McCarthy Quantitative Scale Score for Segregated and Integrated Special Education Conditions

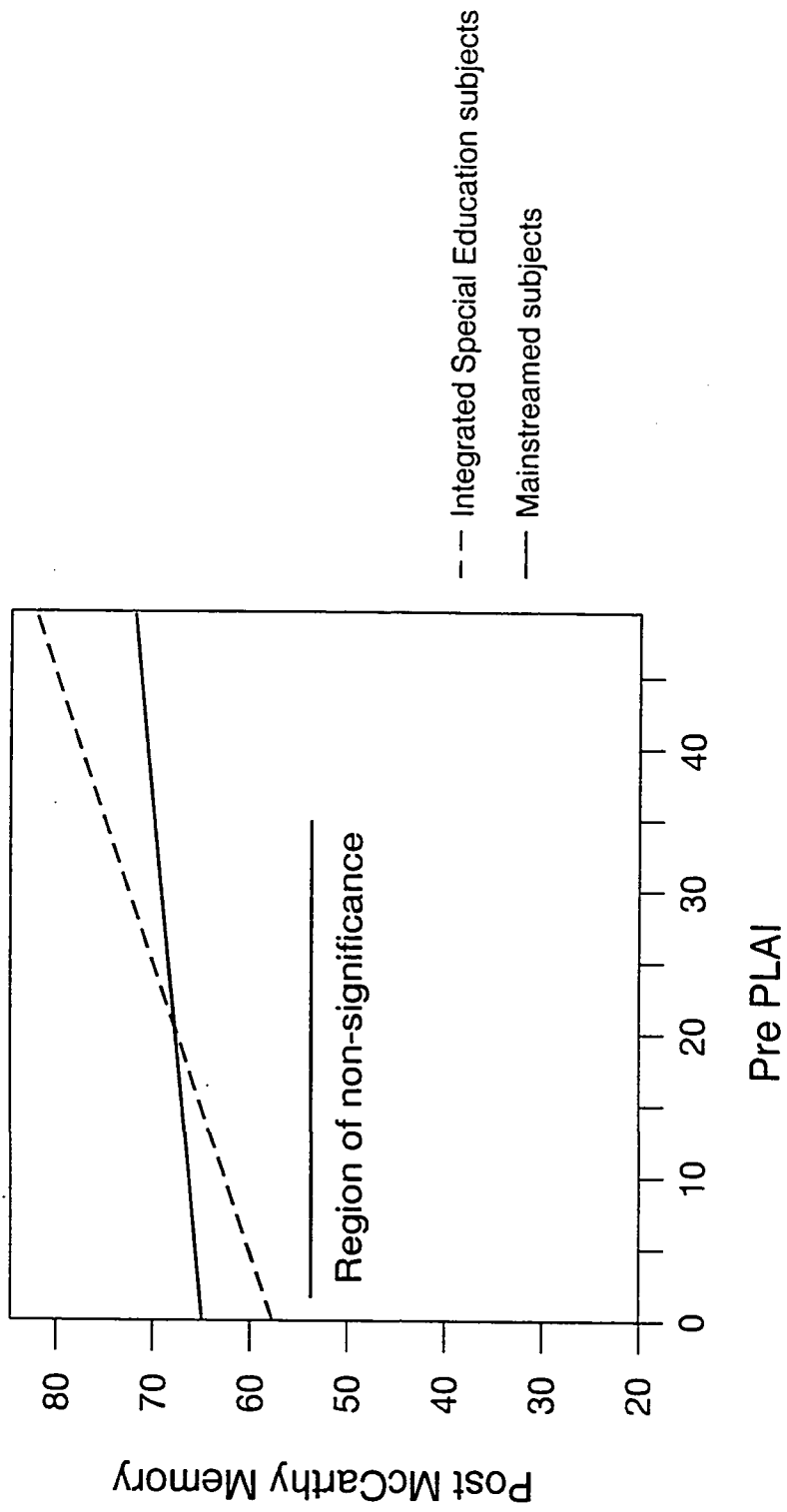


Figure 5: Pretest PLAI Appropriate Responses as a Predictor of Posttest McCarthy Memory Scale Score for Integrated Special Education and Mainstreamed Conditions

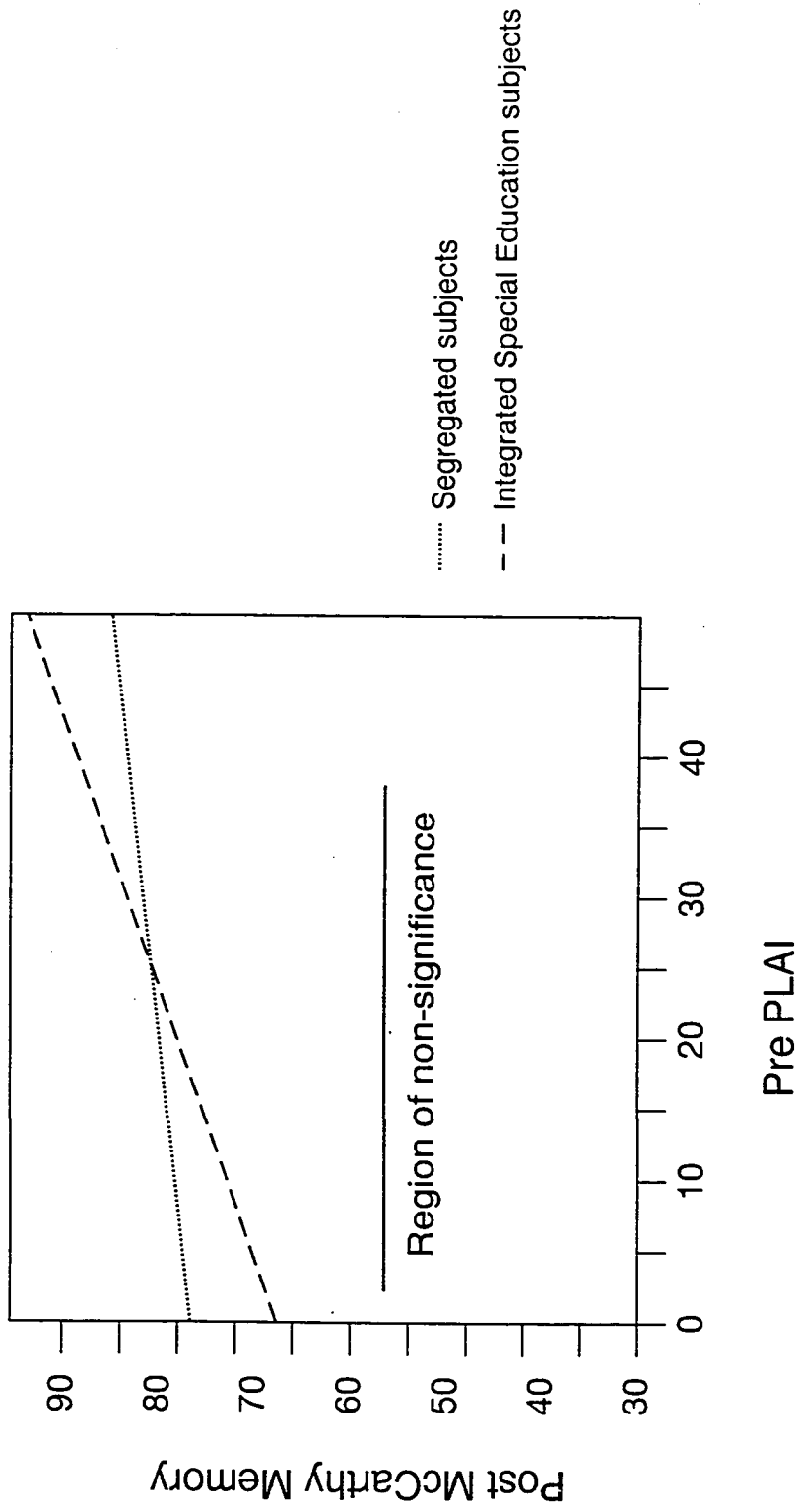


Figure 6: Pretest PLAI Appropriate Responses as a Predictor of Posttest McCarthy Memory Scale Score for Segregated and Integrated Special Education Conditions

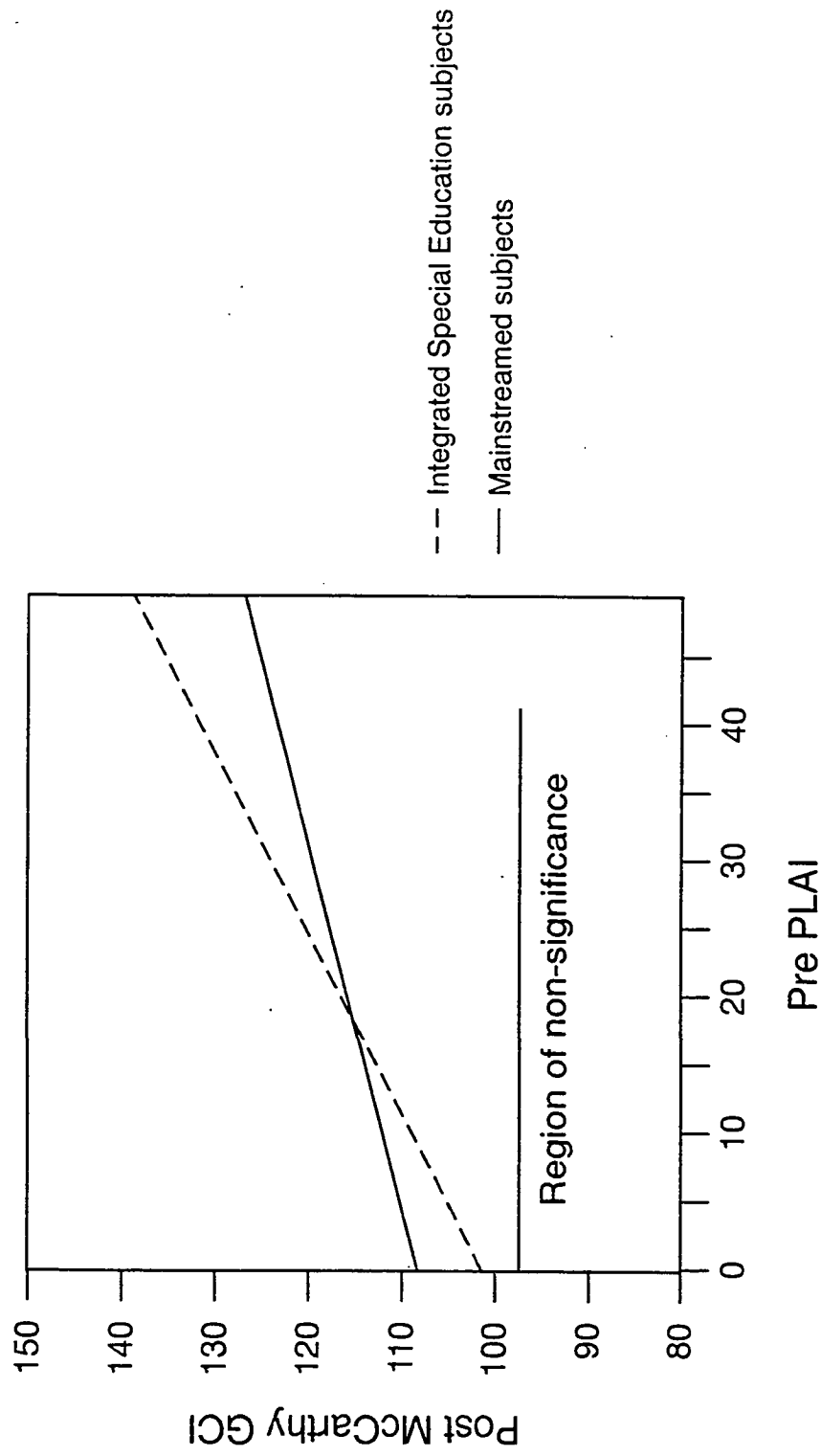


Figure 7: Pretest PLAI Appropriate Responses as a Predictor of Posttest McCarthy General Cognitive Index (GCI) for Integrated Special Education and Mainstreamed Conditions

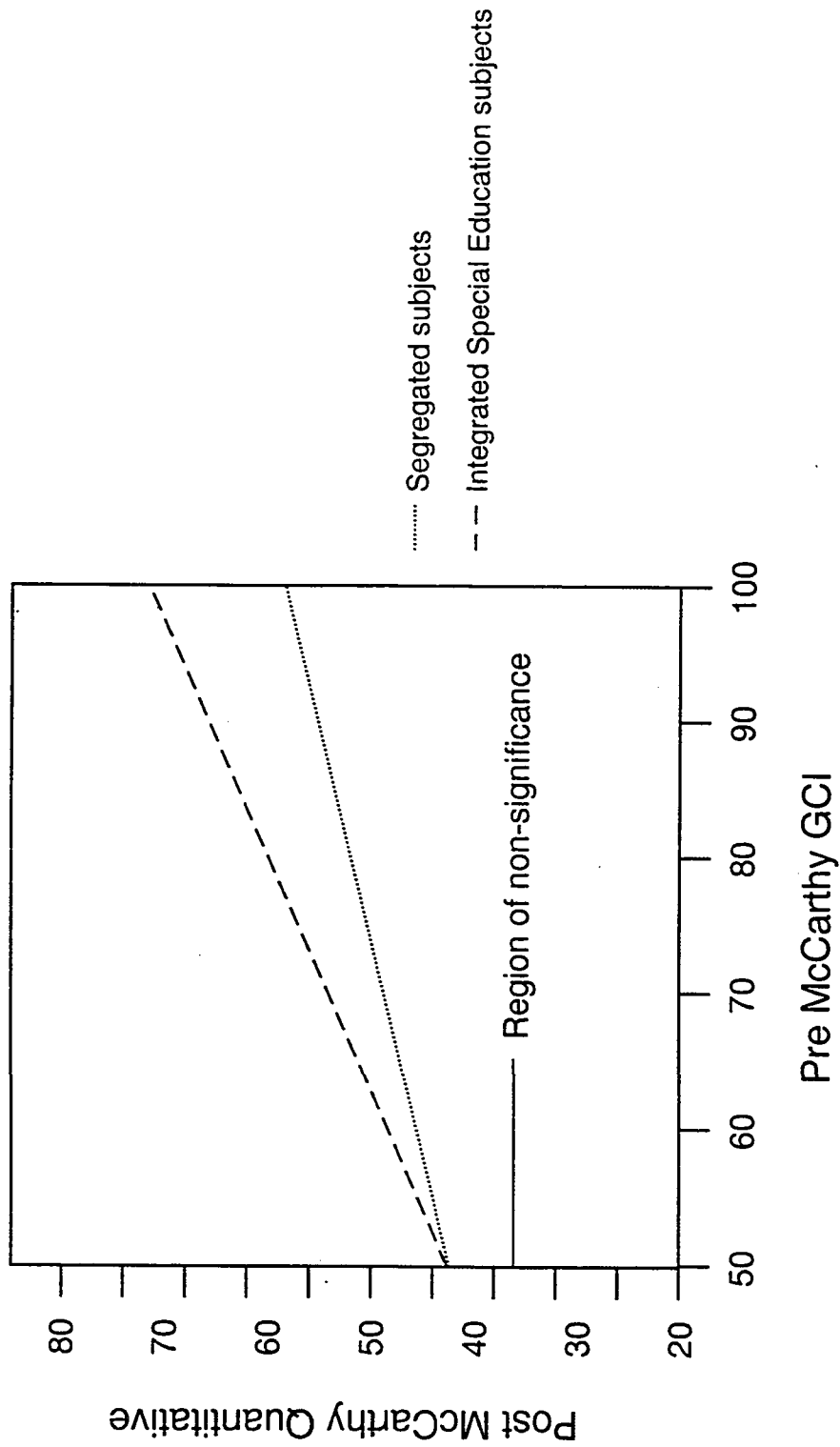


Figure 8: Pretest McCarthy General Cognitive Index (GCI) as a Predictor of Posttest McCarthy Quantitative Scale Score for Segregated and Integrated Special Education Conditions

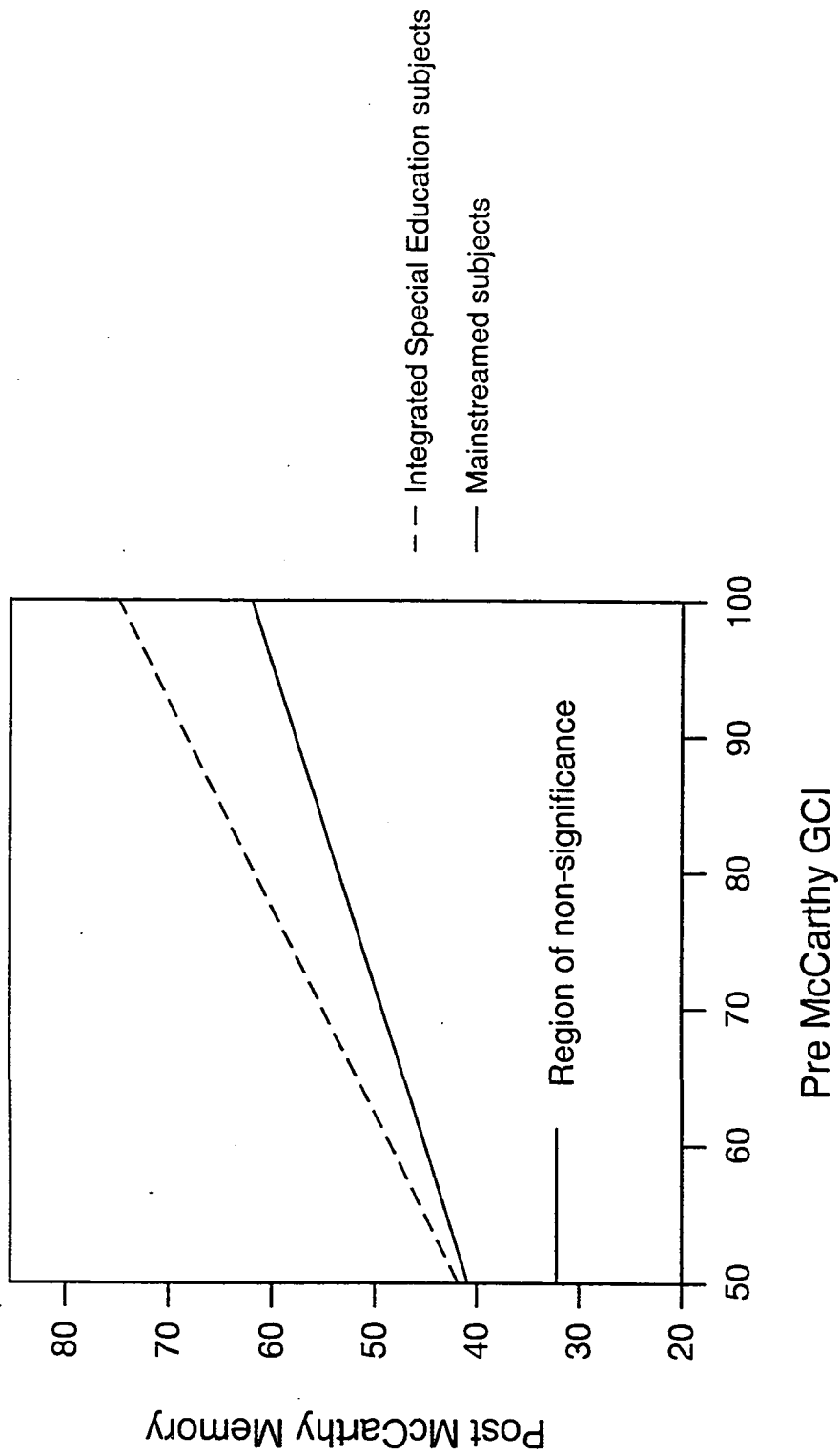


Figure 9: Pretest McCarthy General Cognitive Index (GCI) as a Predictor of Posttest McCarthy Memory Scale Score for Integrated Special Education and Mainstreamed Conditions

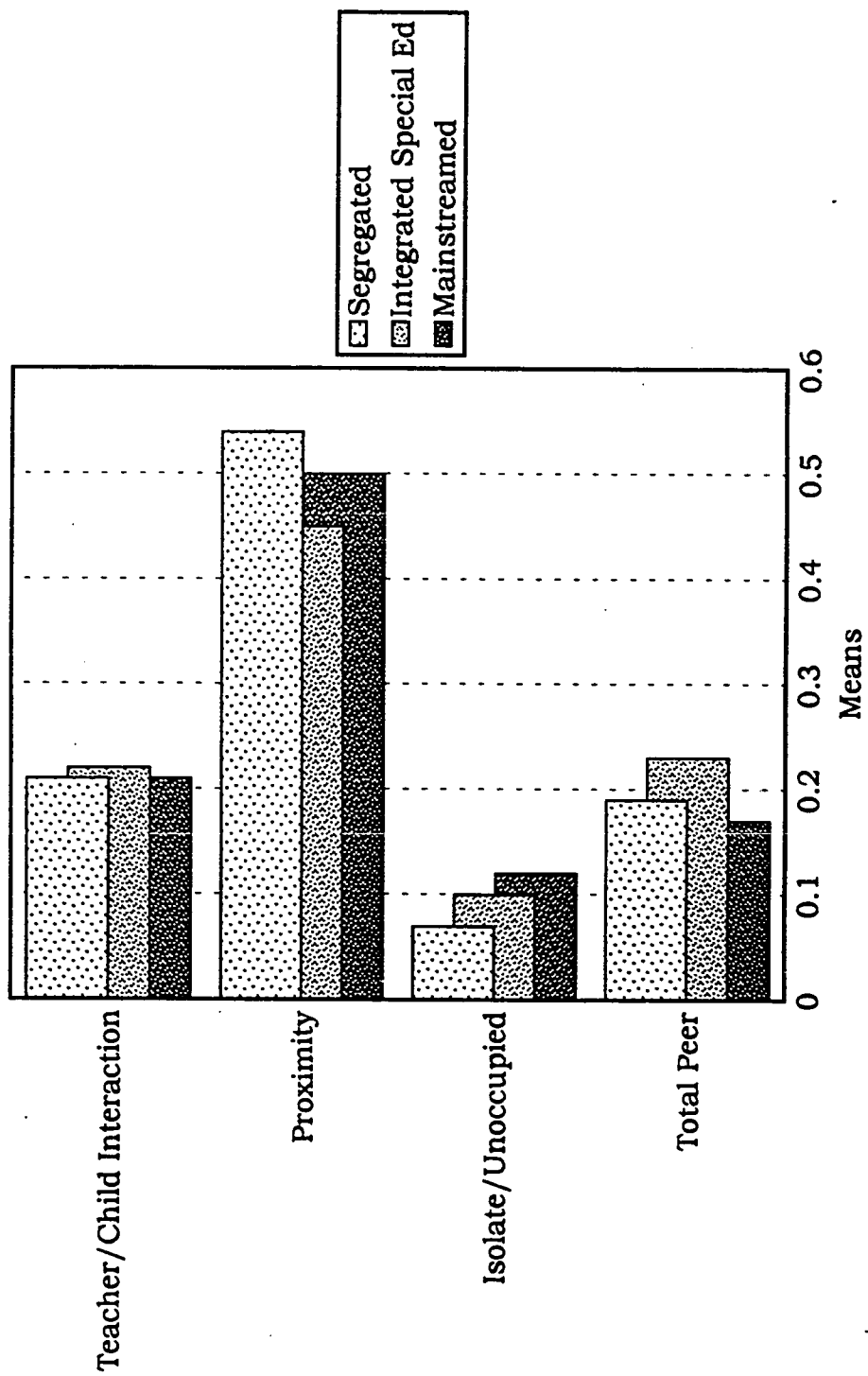


FIGURE 10: Mean Scores of Social Interaction Variables by Classroom Composition

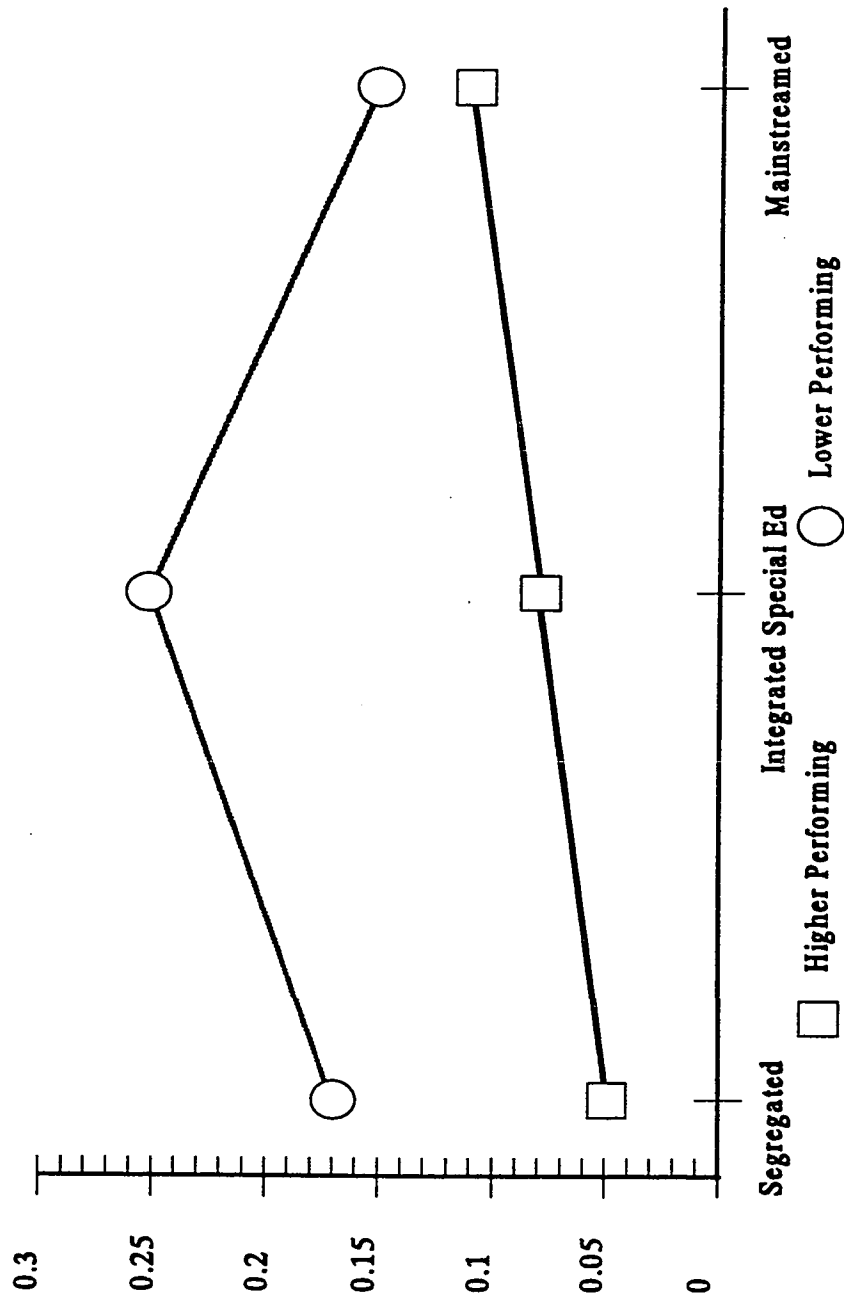


FIGURE 11: Mean Scores of Total SIS Isolate/Unoccupied by Classroom Composition for Higher and Lower Performing Children with Disabilities.

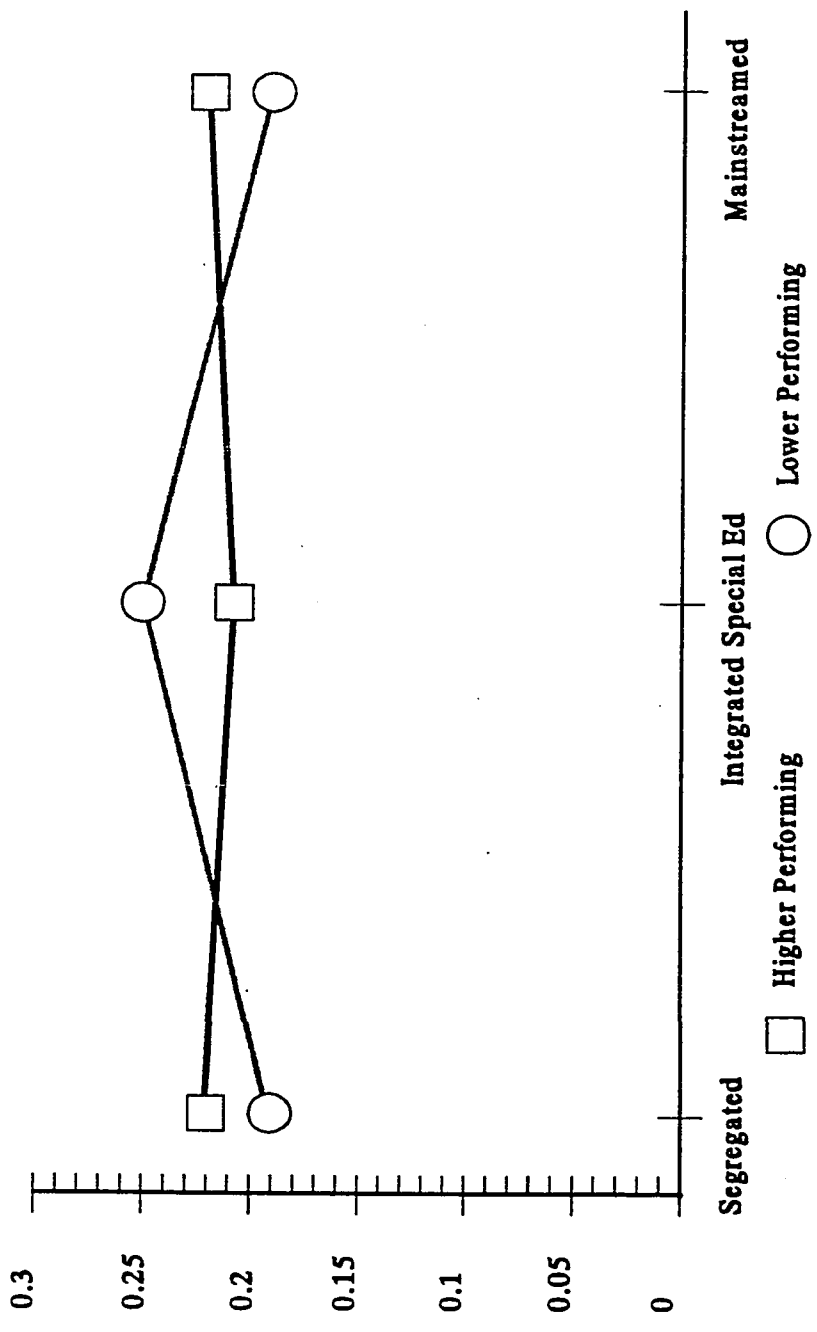


FIGURE 12: Mean Scores of SIS Teacher/Child Interaction by Classroom Composition for Higher and Lower Performing Children with Disabilities.

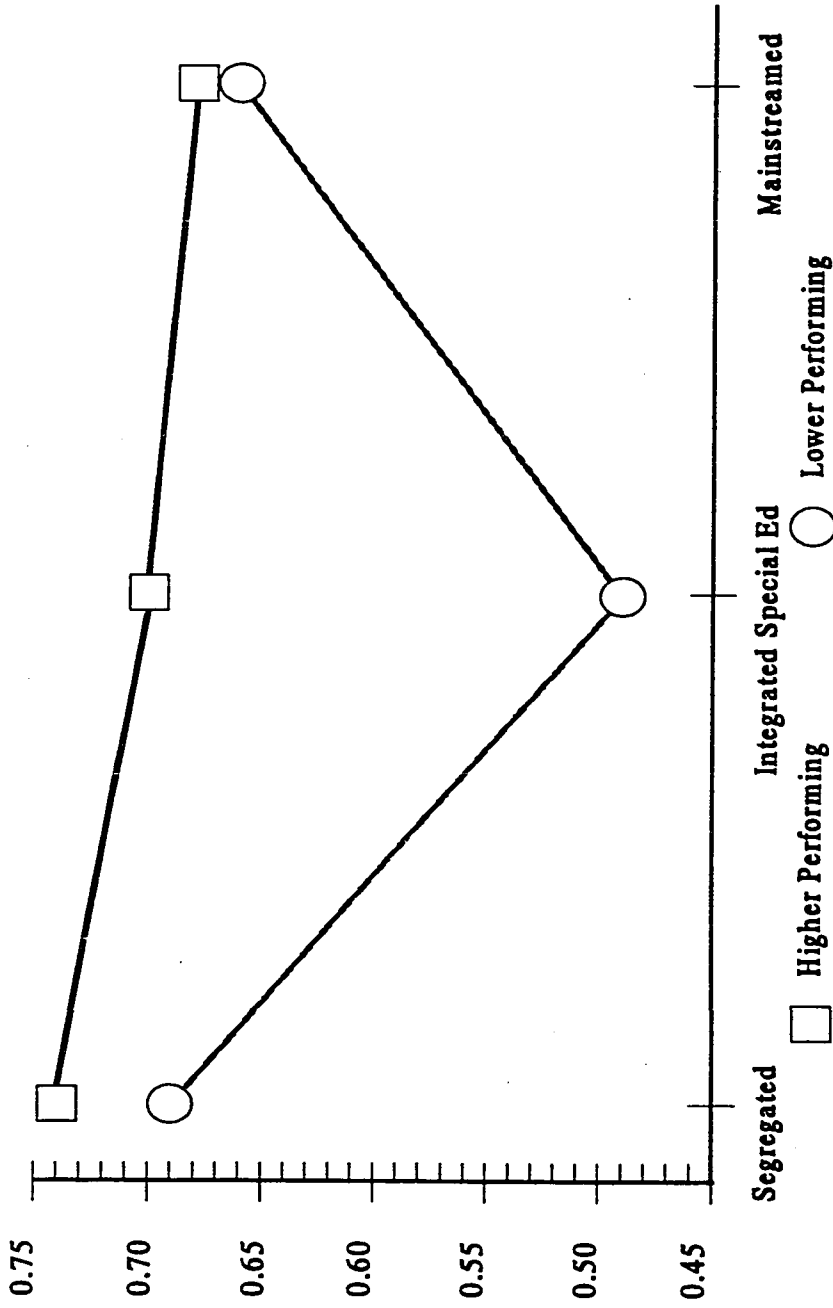


FIGURE 13: Mean Scores of SIS Social Interaction and Proximity Composite by Classroom Composition for Higher and Lower Performing Children with Disabilities.

Discussion

The purpose of this research was to examine the developmental and social behavior outcomes of three types of group composition (segregated, integrated special education, and mainstreamed) for preschool-aged children with disabilities. The study replicated the integrated versus segregated comparisons of Cole et al. (1991), and extended that study by adding a third placement, mainstreaming. The discussion begins with an examination of treatment main effects on developmental and social behavior measures, and then proceeds to a deeper level of analysis involving the interactions between program placement and child characteristics. Finally, I explore a causal hypothesis for the relationship between social behavior and the aptitude-by-treatment interactions found for developmental outcomes.

Main Effects

Developmental Outcomes. Children with disabilities in all three classroom compositions (segregated, integrated special education, and mainstreamed) made significant progress as indicated in their pre- to posttest performance on cognitive (McCarthy GCI) and language (PLAI) measures. Moreover, the McCarthy GCI scale score revealed significant pre-post changes beyond what would be expected from maturation alone.

A unique contribution of this study was the systematic comparison of three different ratios of children with disabilities to typically developing peers. The pretest to posttest changes on the McCarthy and PLAI indicated that the three classroom compositions did not differ in their effects. These results are consistent with those of previous studies which have shown that, on the average, children with disabilities enrolled in preschool programs make comparable developmental progress in segregated and integrated special education classrooms (Jenkins et al., 1985, 1989; Cole et al., 1991), and in segregated and mainstreamed classrooms (Fewell & Oelwein, 1990; Rule et al., 1987).

Social Behavior. The lack of general treatment effects on developmental outcomes was paralleled by classroom behavior measures. Direct observations of the teachers and children revealed no differences across the three classroom compositions in teacher attention, proximity,

isolate/unoccupied behavior, and overall social interaction. Overall, children with disabilities appeared to interact with peers and teachers as much in segregated classrooms as they did in integrated special education or mainstreamed classrooms, a finding consistent with the results of several other studies of social behavior in integrated classrooms (Dunlop, Stoneman, & Cantrell, 1980; Fenrick, Pearson, & Pepelnjak, 1984; and Field et al., 1981).

These results, which are at variance with those of other investigators (Field et al., 1981; Strain, 1984; Guralnick & Groom, 1988; Carden-Smith & Fowler, 1983; Novak, Olley, & Kearney, 1980; Federlein, Lessen-Firestone, & Elliott, 1982; Beckman & Kohl, 1987), may be explained by control over variables which are potentially confounded with different group compositions. When critical variables that mediate social behavior, such as type of disability, amount of teacher attention, and group size are controlled, type of classroom composition does not seem to have direct effects on social behavior. This suggests that the key mediating variables, such as those mentioned above, rather than classroom composition, were responsible for the finding of positive social outcomes for integration in some of the earlier studies.

Previous investigations have reported that when children with disabilities are given the option of playing with other children with disabilities or with typically developing children, they tend to select typically developing children as playmates (Peterson & Haralick, 1977; Field et al., 1981; Beckman, 1983). My results, however, did not replicate their findings. In absolute terms, children with disabilities did have significantly more interactions with typically developing children in mainstreamed classrooms than they did in integrated special education classrooms. In the integrated special education classrooms, children with disabilities had significantly more interactions with children of like ability than with typically developing children. But these results simply reflect the relative proportions of the two types of children in the two settings. The relative proportion of interacting with typically developing peers did not differ among the levels of composition.

This information is positive support for advocates of mainstreaming and inclusion who feel that, for the purposes of social

interaction, children with disabilities should be integrated into settings enrolling typically developing children. However, as mentioned earlier, the presence of typically developing children in both the integrated special education and mainstreamed settings did not change the amount of peer social interaction.

The setting for the present study may provide some explanation for this apparent discrepancy between our findings on children's preference for play partners and the findings of previous researchers. In contrast to other studies of integration where children with disabilities have been introduced into a regular education program, the school attended by the children in this study is a center for the instruction of children with disabilities. The teachers and support staff are educated and certified to work in special education settings. Though several classrooms were mainstreamed for the purpose of this study, there were more children with disabilities enrolled in the school than typically developing children. The early childhood special education focus of these programs may have influenced the level of peer interaction. Studies of teacher interactions with children have indicated that the education focus of the teachers (regular or special education) affects the amount and/or type of verbal interaction they have with children with disabilities (Lynch, Widley, & Johnson, 1988; Hundert, Mahoney, & Hopkins, 1993), which, in turn, influences peer interactions. For example, Hundert et al. found that the amount of peer interaction increased for children with disabilities when the resource teachers focused on groups that included children with disabilities, while the regular classroom teacher's focus on the individual child with disabilities was associated with decreased peer interactions. Given the focus and training of the teachers in this study and the type of classrooms, it is likely that teacher attention had an effect on the proportion of interactions between typically developing children and children with disabilities.

An alternative explanation for the difference between these findings and the findings of others relates to personal characteristics of the children who served as models. A number of the typically developing children had siblings with disabilities. Although pairs of siblings were rarely enrolled in the same classrooms, these typically developing

children were not strangers to children with disabilities and may have provided excellent models of peer acceptance and interaction for other typically developing children.

Summary of Overall Main Effects of Integration Condition

Across the three levels of integration, children with disabilities generally performed at comparable levels on both cognitive and language outcomes. Their social interaction with peers and adults was also similar across conditions. Thus, adding typically developing children to the classroom mix did not appear to affect either the developmental outcomes or the social interaction patterns of children with disabilities. Though their performance levels differed from those of the typically developing children, children with disabilities did make significant gains academically, and spent most of their class time near peers or engaged in peer interaction.

Aptitude-by-Treatment Interaction Analyses for Developmental Measures

Because of the Cole et al. (1991) report of aptitude-by-treatment interactions between segregated and integrated classrooms and child characteristics, I was interested in the possibility that the addition of a mainstreamed condition (i.e., one in which the proportion of typically developing children was increased) would differentially improve outcomes for higher performing children with disabilities and differentially detract from positive outcomes for lower performing children with disabilities. I did find aptitude-by-treatment interactions, but they were somewhat different from what I had predicted. Multiple regression analyses with pretest McCarthy GCI and PLAI scores as the predictor variables revealed a pattern of aptitude-by-treatment interactions in which the lower performing children with disabilities made relatively greater gains in segregated *and* mainstreamed classrooms, and the higher performing children with disabilities made relatively greater gains in integrated special education classrooms. An examination of Figures 1-9 suggests that the posttest differences between lower performing and higher performing children with disabilities are more prominent in the integrated special education condition than they are in the mainstreamed and segregated settings. The results for the segregated

and integrated special education classrooms replicated those of Cole et al. (1991) (no mainstreamed condition was included in that study). The present study and Cole et al. were comparable on the age and ethnicity of the sample and on the length of school day, but the children in my study averaged about 1 SD lower on the McCarthy than did Cole's et al.

Were one to consider only the results of the integrated special education and segregated classroom compositions in the present study along with the results of Cole et al. (1991), it would be tempting to hypothesize that adding even more typically developing children to integrated special education classes might result in even greater outcomes for higher performing children with disabilities. If a few typically developing peers are helpful for the higher performing group, then one might extrapolate that even more would be better. However, results from the integrated special education and mainstream comparison indicate that adding more typically developing children to the integrated special education classroom mix did not improve outcomes for the higher performing children with disabilities. There were more than twice as many typically developing children in the mainstreamed classrooms as were in the integrated special education classrooms (proportionally, 21% were typically developing in the integrated special education vs. 64% in the mainstream setting). Rather than *benefiting* from the larger numbers of typically developing classmates, higher performing children with disabilities in the mainstreamed classrooms did worse than the higher performing children in the integrated special education setting, and performed no better than the higher performing children in the segregated classrooms. Thus, simply adding typically developing children did not yield better outcomes for higher performing children with disabilities. The data suggest that the ratio of typically developing to special education children found in integrated special education classrooms may be the optimal ratio for improved outcomes for higher performing children with disabilities, and that either higher (mainstreamed) or lower (segregated) ratios of typically developing classmates may hinder the progress of the higher performing children.

The differential effects of the integrated special education and mainstreamed conditions may help resolve a potential dilemma in student placement raised by the results of Cole et al. They found that there were some slight but statistically significant benefits of segregation for children who were relatively lower functioning. Should we, then, reconsider the use of segregated programs for these children? The present findings make this question moot. It appears that outcomes for lower performing children with disabilities are comparable whether served in mainstreamed or segregated settings, while the higher performing children with disabilities are better served in integrated special education settings. Thus, both groups can be provided optimal developmental programs in settings which are integrated to varying degrees. This concept, however challenges the current zeitgeist which advocates one type of placement (full inclusion) for all children. By limiting placement for special education children to mainstreamed classrooms only, some children (i.e., higher performing children with disabilities) may not have an optimal learning environment.

Explanations for Aptitude-by-Treatment Interactions

Cole et al. proffered peer modeling (via typically developing children) and teacher behavior as potential explanations for the direction of the aptitude-by-treatment interactions in their study. It was suggested that the interactions between typically developing children and children with mild disabilities may have been more sophisticated than the interactions between typically developing children and children with moderate disabilities, resulting in more facilitation of the language and cognitive development of the children with mild disabilities. It was also suggested that teachers may have provided a more complex and fast-paced instruction in the integrated special education classrooms in order to keep the attention of the typically developing children, and that the increased level of instruction may have facilitated learning in children with mild disabilities. I sought to test these explanations by relating higher performing and lower performing children's interactions with peers and adults to the group composition. It appears that the classroom behavior of lower performing children with disabilities across different levels of integration differed substantially from the performance of the

higher performing children with disabilities. The setting altered the size of the difference between higher performing and lower performing children with disabilities, as well as the uniformity of performance across the three settings for the lower performing children with disabilities.

I will consider three explanations: (1) the differences in isolate play for lower performing children with disabilities in different classroom compositions; (2) the influence of self-perception on higher performing children with disabilities; and (3) the grouping practices (homogeneous or heterogeneous) for higher performing children with disabilities. The pattern of isolate/unoccupied (I/U) play for lower performing children with disabilities across the three classroom compositions closely mirrored the pattern of achievement. Lower performing children with disabilities engaged in more isolate/unoccupied play in integrated special education classrooms relative to the other two settings, and they achieved the smallest gains in cognitive and language development in this setting. From a skill-modeling perspective, being near and interacting with higher functioning peers (typically developing children and children with mild disabilities) is important to the development of lower performing children's cognitive and language skills (see Guralnick, 1981a for review). But why would lower performing children with disabilities spend less time interacting with peers in integrated special education classrooms? I looked into the possibility that teacher behavior mediated this effect. Though not statistically significant, the lower performing children with disabilities appeared to receive somewhat more teacher attention in integrated special education classrooms than in the mainstreamed or segregated classrooms. Amount and type of interaction with the teachers could undermine interactions with peers, thus isolating the lower performing children from the benefits of peer interaction (Stipek & Sanborn, 1985).

In contrast to the findings for lower performing children with disabilities, peer interaction did not provide an explanation for the absence of a relationship between the classroom behavior and cognitive/language performance for higher performing children with disabilities. These children made greater cognitive/language gains in integrated special education than in mainstreamed or segregated

classrooms, but their classroom interactions with peers, proximity to peers, and isolation was comparable across the three classroom compositions. A limited second explanation for the aptitude-by-treatment interaction results is that the effect of classroom composition is mediated by self-perception (Renick & Harter, 1989; Silon & Harter, 1985). Differing ratios of typically developing children to children with disabilities may affect the way that children with disabilities rate themselves, which in turn could affect their motivation and achievement. When comparing themselves to the majority of children in a mainstreamed classroom where most children are higher functioning, children with disabilities may rate themselves lower. In contrast, they may rate themselves higher when comparing themselves with a group where most children have abilities similar to their own. Allgood-Hill (1991; as reported in Buysse & Bailey, 1993), found that children with disabilities enrolled in integrated special education settings were more likely to be rated as desirable playmates by typically developing peers than when enrolled in mainstream settings. This explanation is limited in that it explains differences between the integrated special education and mainstreamed classrooms only. It does not follow that higher performing children with disabilities in segregated classrooms would perform at lower levels on developmental outcome measures, and yet rate themselves on a self-rating measure as more desirable than lower performing children with disabilities. It is possible, however, that the higher performing children would rate themselves lower (thus affecting motivation and achievement levels) if aware that they were in a totally segregated special education setting and unable to interact with typically developing children.

A third possibility is that the different outcomes for higher performing children with disabilities in the three settings may have been mediated by grouping practices associated with the different classroom compositions. Teachers in the segregated and mainstreamed classrooms may have resorted to more homogeneous grouping, separating lower performing from higher performing children with disabilities in the segregated classrooms, and the children with disabilities from typically developing children in the mainstreamed classrooms. That would not

work as well in the integrated special education setting, with so few typically developing children (three in a class). It is possible that the higher performing children with disabilities in the integrated special education classrooms were perceived as closer in ability to the typically developing children than to the lower performing children with disabilities, which might have resulted in placement of the higher performing children with disabilities with typically developing children in the small groups. Homogeneous grouping may have permitted teachers to provide more tailored instruction, resulting in different cognitive and language instruction in the integrated special education programs as compared to the segregated or mainstreamed classrooms.

Summary of Aptitude-by-Treatment Interactions

The relationship between the aptitude of children with disabilities and the particular type of classroom composition in which they were enrolled is important. Both this study and Cole et al. (1991) found that higher performing children with disabilities benefited more from integrated special education classrooms, and lower performing children with disabilities benefited more from segregated classrooms. This study adds another piece to the puzzle: segregated and mainstreamed classrooms resulted in similar effects on cognitive and language development. Teacher attention is suggested as a possible explanation for this pattern for lower performing children with disabilities; that is, teachers may have been isolating lower performing children from their peers, thus reducing their exposure to important models of language and cognitive development.

Social observations did not reveal as consistent a pattern as test performance. The higher performing children with disabilities did not vary in their performance across levels of integration, while the lower performing children with disabilities appeared to engage in relatively more isolated play in integrated special education and relatively less isolated play in mainstreamed and segregated classrooms. As mentioned earlier, type and/or amount of teacher attention may have some isolating influence on interaction patterns for the lower performing children. Alternative explanations are offered for both groups.

One needs to be cautious in interpreting these results. First, the generalization of information beyond the age group (three-to-six-year-olds) and range of disabilities (mild to moderate) represented here is not recommended. The day-to-day stability of the social relationships formed by young children is questionable and, as illustrated in this research, aptitude is an important factor to investigate further, or control for, in future research. Secondly, the mainstreamed condition in this research may not be considered typical, and thus generalizable. The program was staffed by early childhood special education personnel rather than regular early childhood education personnel, and was located in a school which specializes in services to children with disabilities. Thirdly, the amount of variance which is accounted for by the interaction between aptitude measures and performance on structured test measures ranged from 4% to 15%. Though significant, it represents a small difference in test performance: the pretest scores accounted for 19% to 47% of the variance in posttest scores, and classroom composition accounted for 1% to 7%. Therefore, any conclusion that higher performing children should be placed only in integrated special education classrooms and lower performing children should be placed only in mainstreamed or segregated classrooms is probably premature.

For Further Consideration

Future Research. Areas of future research suggested by the results of this study include observations of the interactions of children with disabilities with typically developing children, and an analysis of these interactions using instruments which qualify as well as quantify the interactions. Though the amount of social interaction (both with peers and teachers) may not differ, the qualification of the type of verbal versus physical interaction of both adults and children in each situation might yield important results. Perhaps the teachers in the integrated special education condition were initiating and/or responding differentially to higher performing and lower performing children with disabilities than the teachers in the mainstreamed or segregated conditions. These analyses could include a linguistic analysis of the recorded language (e.g., frequency of the use of different words, number of utterances) and the pragmatic skills (e.g., number and type of

initiations and responses) of both adults and children in the situation. It might also be important to record instances of acceptance and rejection by classmates. This information may be affected by level of integration as well as by degree of disability.

This study focused on groups of children with a wide variety of disabilities. A closer analysis of cognitive, language, and social information for more specific kinds of disabilities would be very helpful; that is, of children with serious behavior disorders, children with physical disabilities, or as suggested by the aptitude-by-treatment interaction results, children with varying levels of cognitive delays.

Efforts need to continue to analyze the effects of integrating different proportions of children with disabilities with typically developing children. Such investigations might provide information on the balance (or balances) which benefit the greatest number of children both academically and socially.

Program Placement. In contrast to the current trend toward full inclusion of all children, the results of this study support the use of a continuum of services which allows a match-up between child aptitude and classroom composition. These results also challenge Guralnick's (1990a) contention that integrated special education models are not an appropriate means of integrating classrooms. Our empirical examination indicates that the integrated special education model may, in fact, be an optimal model for some children with disabilities.

The potential influence of mediating variables should be considered. If the assumption is made that previous studies were conducted in programs of manageable size, with educated, caring adults (Allen, 1992), the quality factors need to be identified and applied to on-going programs.

In our quest to optimize developmental and social performance outcomes, we must consider other issues when making decisions about where a child might best function socially and academically: parental expectations, concerns, and program satisfaction; the ethical and legal considerations for integration; and the goals that each community has for the role of individuals--these must all be taken into account.

Regardless of what placement decision is made, it is critical that each child's progress continue to be monitored, ensuring the most appropriate placement. This is no small task and shall continue to provide considerable material for further investigation.

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Appendix A: Literature Review

Support for the integration of children with disabilities with typically developing children has gained considerable momentum during the past 20 years. This support has come primarily from the legalistic and philosophical arenas.

In past legislation as well as the current Individuals with Disabilities Education Act (IDEA), the education of children with disabilities alongside typically developing children in least restrictive environments (LRE) has been a focus. Though the terms "mainstreaming," "integration," and, most recently, "inclusion," have been used in place of "least restrictive environment" in discussions of policy and research, these words are rooted in the social philosophy of normalization (Wolfensberger, 1972) which, when applied to children with disabilities, specifies that they have the opportunity to participate in educational situations which reflect the norms and patterns of the mainstream culture (Nirje, 1985).

These terms assume that a group exists which typifies the culture or mainstream (the regular classroom) into which those who do not usually belong (children with disabilities) want to integrate. That which constitutes acceptable integration has varied over time. Our culture has changed from being satisfied with enrollment of children with disabilities in separate classrooms in the same building as classrooms of typically developing children, to being supportive of the idea of inclusion, which suggests children should be educated in the classroom they would normally attend (Salisbury, 1990). This latter term obviously supports

Note: The definitions of the terms integration, mainstreaming, integrated special education, and segregation are as follows: (1) Integration is the more general term used to indicate some level of intentional combining of children with disabilities with typically developing children; (2) In mainstreamed classrooms, a subtype of integration, typically developing children are equal to or outnumber children with disabilities; (3) In integrated special education classrooms (a second type of integration) the number of children with disabilities is greater than the number of typically developing children; (4) Segregated classrooms enroll only children with disabilities and therefore contrast with integration.

the concept of mainstreaming and further limits the definition of what would be considered an appropriate level of integration.

The least support for integration has come from the research efforts evaluating the educational benefits of integration. Though the questions posed have changed from *Does mainstreaming work?* (Guralnick, 1981a), to *How can we design programs to maximize its effectiveness?* (Guralnick, 1990), there is still some concern about the consistency of results and effectiveness of placing children with disabilities together with typically developing children. Because studies have varied widely in programmatic variables, conclusive findings about the effects of integration have been difficult to identify (Odom & McEvoy, 1988; Lamorey & Bricker, 1993; Buysse & Bailey, 1993).

To date, reviews of integration studies have arrived at a consensus: developmental outcomes, as measured by standardized tests which produce mean scores or a measure of rate of development, do not seem to be affected by placement in segregated or integrated classrooms (Odom & McEvoy, 1988; Buysse & Bailey, 1993; Lamorey & Bricker, 1993). Children with disabilities enrolled in segregated programs perform as well on developmental measures as those enrolled in integrated programs. Mainstreaming does not help and it does not hurt.

The reviews of social/behavioral outcomes are also consistent. They concur that integration may occur naturally for some children (mildly handicapped) but that interventions are necessary for other children (moderate to severe) (O'Connell, 1984; Guralnick, 1990; Odom & McEvoy, 1988; Buysse & Bailey, 1993; Lamorey & Bricker, 1993). There is concern expressed regarding the lack of research on the generalization of findings across populations and settings (Lamorey & Bricker, 1993).

This review of research attempts to further inform and clarify the issues surrounding the integration of young children with disabilities by reviewing comparative studies. Studies which directly compare the effects of segregation and integration on the behavior of young children with disabilities are our only opportunity to provide some kind of control over programmatic variables and thus isolate those which have the most significant influence. Through a systematic application of the inventory of potential mediating variables identified in individual studies, a basis

is established for more extensive research in the study of the influence of those variables on the outcomes for children with disabilities.

A current computer search of ERIC and PsychLIT databases produced 23 comparative studies, 22 of which had been identified by Buysse and Bailey (1993) in their review of comparative studies. I used their criteria to determine each study's eligibility for review: (1) children in the studies had to be enrolled in early intervention programs; (2) the studies must have a comparative research design involving either between-group or within-group measures; and (3) they must have had at least one measure of child outcome (developmental, social behavioral or other behavioral) which compared the effects of integrated and segregated settings on young children with disabilities.

This review, except for the consideration of level of disability, concurs with previous reviews that developmental outcomes for children with disabilities are not affected by their placement in segregated or integrated classrooms. Contrary to the majority of summaries of previous research, this review supports a more cautious hypothesis for social-behavioral outcomes, which indicates that mediating variables may better explain the outcomes of studies than does the practice of placing children with disabilities together with typically developing children.

A review of comparative studies involving developmental outcomes is presented first, followed by a review of studies involving both social and behavioral outcomes. In each section, studies are grouped as to indicated outcomes across dependent variables, subjects or studies: (1) no differences--studies which demonstrate no differences between the two conditions; (2) mixed outcomes--studies which reported mixed results (both positive and negative) for integration; (3) positive outcomes--studies which reported consistent positive outcomes for integration; and (4) negative outcomes--studies which reported consistent negative outcomes for integration. It should be noted that though these definitions are the same as those used in Buysse and Bailey, there are some differences in the categorization of the studies.

Developmental Outcomes

Seven of the reviewed studies contained some standardized measure of developmental growth in cognition, language, and/or motor behavior. The results of the studies were expressed in either a comparison of pretest and posttest means or rate of development. Three of the studies indicated no differences for children with disabilities between performances in segregated settings and integrated settings. Four of the studies were reported to have mixed results. Summaries of each of the studies and explanations for the mixed results are presented. No studies were categorized as reporting clearly positive or negative results.

Studies with No Differences. In an experimental, between-subjects design study, Jenkins, Odom, and Speltz (1989) investigated the effects of integrated and segregated settings on the developmental outcomes of 56 children with disabilities randomly assigned and enrolled in six classrooms: four integrated and two segregated. Each classroom enrolled 12 children, with a balance of 8 children with disabilities and 4 typically developing children in each integrated class. Integrated and segregated classrooms were equally divided between two treatments: a social interaction play condition and a child-directed play condition. In the social interaction play condition, the teacher assigned children to groups (2-3 children with disabilities and 1-2 typically developing children in each integrated group) for free play; children rotated through activities as a group, and adults mediated and supported the activities and interactions in the group. The child-centered condition employed techniques from the High Scope program. Children were allowed to group themselves by choice and choose their own play areas. The role of the teacher was to extend activities and play ideas. Variables such as teacher-child ratio and number of support staff were similar across all conditions. Results on preacademic achievement and motor pre- and posttest measures indicated no differences between integrated and segregated groups.

In a study by Harris, Handleman, Kristoff, Bass and Gordon, 1990, the language development of 10 children with autism was evaluated in a pre- and posttest quasi-experimental, between-subjects design in which

half the children with autism were enrolled in a segregated classroom and the other half were enrolled in an integrated classroom. Rate of development was the measure used for analysis. Subject characteristics and outcome measures were provided on 4 typically developing peers who were enrolled in the integrated classroom. (One typically developing child enrolled in the program was not included in the evaluation due to an ESL language difference.) It should be noted that the typically developing children were an average of 10 months younger than the children with autism. In addition to differences in class size (5 in segregated; 10 in integrated), the segregated classroom provided more individualized attention and a lower teacher-child ratio as compared to the integrated classrooms (3:5 as compared to 3:10). In general, all children made progress. Both groups of children with autism increased their rate of development in language acquisition. There were no significant differences between children with disabilities enrolled in segregated or integrated classrooms.

Rule et al. (1987) compared the progress of children enrolled in their Social Integration Program (SIP) with the progress of children in three other settings: children with disabilities enrolled in segregated classrooms (without any social training program), Head Start programs, and typically developing children. The SIP program, consisting of 26 curriculum units developed to increase social skills of children with disabilities enrolled in mainstreamed day care programs, was delivered through microsessions or coincidental teaching to children enrolled in 10 classrooms in three different day care centers. Thirty-one children were served over three years. The data reported in this study included only the second year data collected on 15 of the children. The children ranged in age from 3 to 5 years, and represented broad ranges of disabilities and SES levels. Each mainstreamed classroom enrolled 1-3 children with disabilities with a teacher-child ratio of 1:15. Each comparison involved the matching of SIP children with children in each comparison group: (1) 12 SIP children were matched (by CA and MA) with 12 children with disabilities from segregated programs; (2) 9 SIP children were matched (by CA) with 9 children from Head Start programs; and (3) 12 SIP children were matched with 12 typically developing children (by CA). Pre-post

changes from normative tests and criterion-referenced tests were used as measures of progress. A significant difference from pre- to posttesting was indicated. In an analysis of covariance used to determine between-group differences on post-test scores, no statistical differences were found between SIP children and children with disabilities in segregated programs, or between SIP children and Head Start children. As would be expected, the typically developing children made greater educational gains on the criterion-referenced tests, but not on mental age. Regardless of placement, children with disabilities made comparable developmental gains.

Studies with Mixed Results. Cooke, Ruskus, Apolloni, and Peck (1981) reported on the results of three evaluations done separately over a period of three years. In each case, children were selected from integrated and segregated classrooms for evaluation. The conditions considered were: (1) children with a disability enrolled in an integrated class; (2) children with a disability enrolled in a segregated class; (3) typically developing children enrolled in an integrated class; and (4) typically developing children enrolled in a segregated class. There is minimal information provided on variables in the classroom environments; for instance, information was not provided on the number of children enrolled, the ratio of children with disabilities to typically developing children, the teacher-child ratio, or schedules of activity. Sixty children participated in study 1. There was no mention of ratio of children with disabilities to typically developing children. Study 2 contained 37 children with disabilities and 60 typically developing children, while study 3 contained 44 children with disabilities and 73 typically developing children. Though ages were not reported on children in study 1, no age differences between children with disabilities and typically developing children were reported on studies 2 and 3. Children ranged in age from 2-5.8 years. A pre- posttesting, quasi-experimental design was used. The mean scores were used in analysis. It should also be noted that though three standardized measures were used, little information is provided about their administration. The Peabody Picture Vocabulary Test is typically administered directly to children. Two of the measures used (Vineland Social Maturity Scale and the Alpern-Boll

developmental Profile) are typically administered as adult interviews. In these studies this information was provided by the teachers. Though studies 2 and 3 were considered a replication of study 1, the results varied across studies. In study 1, children with disabilities performed similarly in both settings. Though children with disabilities in integrated settings had higher posttest scores on the Vineland than children in segregated settings, these results were not significant. In study 2, it was reported that children with disabilities in the integrated settings made significant gains on all measures and at a higher level than differences found for typically developing children. No mention is made of a comparison to children with disabilities in segregated settings and no specific data is provided to review. In study 3, the children with disabilities enrolled in integrated programs performed significantly better on the Alpern-Boll communication sub-scale.

Without more information about the classroom settings in which these children were enrolled it is difficult to interpret this information and generalize it to other settings. The reports of inconsistent results of the typically developing children in the two different settings over the three studies suggests that factors other than their presence may have been at work in these studies. The fact that two of the measures are gathered by teacher report and only one is an actual test of children's behavior pre- to posttest, should also raise some question about adequacy of information.

In a between-subjects, experimental design, Jenkins, Speltz, and Odom (1985) tested 36 children with disabilities, randomly assigned and enrolled in two integrated special education classrooms and two segregated classrooms. Each classroom enrolled 11 to 12 children, with the integrated classrooms containing 8 children with disabilities and 3-4 typically developing children. The age range of children was 3-6 years, with the typically developing children averaging 11 months younger than children with disabilities. Variables such as teacher-child ratio, number of support staff, schedule of activities, and teacher preparation were similar across classrooms. Pre- and posttest measures, collected 9-1/2 months apart, included language, cognitive, and motor behavior assessments. Children with disabilities performed equally well in both

conditions on all measures except for motor behavior. Children in one segregated classroom did much better on the gross motor measure. This was explained by an unusual amount of outside physical therapy for the children in that classroom.

In a quasi-experimental design, Fewell and Oelwein (1990) evaluated the effects of three different conditions of mainstreaming on 135 children enrolled in 14 different outreach sites for a Model Preschool Program for Children with Down Syndrome and Other Developmental Delays. Mainstreaming conditions varied depending on the number of minutes/week in mainstreaming: (1) 0 ; (2) 30-300 ; and (3) 301-1050. Children with disabilities varied in age from 3 to 10 years. No information was provided about the characteristics of the typically developing children (age, gender, ethnicity), the teacher-child ratios, the ratio of children with disabilities to typically developing children, the number of children enrolled in each classroom, or a comparison of the spatial aspects of each classroom. The measure used to compare conditions was a curriculum assessment, administered pre- and posttest design. An analysis of the rate of development indicated no differences between the performances of children with disabilities in the three conditions across the six developmental domains of the curriculum assessment. There was an indication that children with Down Syndrome in segregated classrooms performed significantly better on the expressive communication domain, but this was explained by the curriculum emphasis on this aspect of training and the lower teacher-child ratio in the segregated classrooms.

A study by Cole, Mills, Dale, and Jenkins (1991) also reported mixed results. This experimental, between-subjects study evaluated the pre- to posttest performance of 124 children: 100 children with disabilities and 24 typically developing children enrolled in integrated and segregated classrooms. Each classroom enrolled a total of 14 children. Each integrated classroom contained 10 children with disabilities and 4 typically developing children. Children were randomly assigned to classrooms. Though the study took place over a four-year period, only data from children's first year in the program was used for analysis. The children, who ranged in age from 3-6 years, represented a

wide range of disabilities and different ethnicities. Classrooms maintained the same teacher-child ratio, and were served by the same number of support staff. Though two different curriculum approaches were represented, the number of children enrolled in each program approach was equally represented in both segregated and integrated classrooms. Overall, the mean change in performance on standardized measures of language, cognition, and early reading indicated no differences between integrated and segregated subjects. Aptitude-by-treatment interaction analyses did yield an interesting pattern of results. Lower performing children with disabilities performed at a higher level in segregated classrooms than in integrated classrooms, and the reverse was true for higher performing children. Though the variance accounted for by the interaction between aptitude measures and test performance was not large (4% to 5%), it is the first research evidence, using aptitude as a continuous variable, that the level of a child's disability may be differentially influenced (higher or lower test scores) by enrollment in either a segregated or integrated environment.

Summary of Review of Developmental Outcomes.

It appears that the developmental outcomes for children with disabilities do not vary as a function of level of integration. Despite the wide variation in variables across studies (e.g., number of children studied, ratio of children with disabilities to typically developing children, classroom size, adult-child ratio, type of curriculum), the results tell the same story. Four of the seven comparison studies showed mixed results, but for very different reasons. The study by Cooke et al. obtained conflicting results over the three different years of the study. There were three identified and three potential threats to validity which would raise questions as to the strength of the design (Buisse & Bailey, 1993). The mixed results for the Jenkins et al. (1985) and the Fewell and Oelwein (1990) studies could be explained by confounding variables. In Jenkins et al. (1985), the children with disabilities in the segregated program outperformed children with disabilities in the integrated program on the motor behavior measure. This was explained by increased participation in physical therapy for the children in the segregated classrooms. In Fewell and Oelwein (1990), children with

disabilities in the segregated program outperformed children with disabilities in the integrated program on an expressive language measure. This was explained by stronger emphasis on language development, teacher training, and the higher adult-child ratio in the segregated classrooms. Like five of the other studies, the Cole et al. (1991) study indicated that the children with disabilities showed no outcome differences in segregated and integrated classrooms. It wasn't until additional analyses were performed on the data-- aptitude-by-treatment interactions, using aptitude as a continuous variable--that there was an indication of differential performance depending upon level of disability. No other comparative studies previously attempted to answer the question of the influence of degree of disability in this way. One other comparative study (Guralnick, 1981b, mentioned later in the social behavior outcomes section), explored the effects of four levels of disability (typically developing; mild, moderate and severe disabilities) and two class compositions (unmixed, typically developing, and mild vs. mixed, moderate, and severe) over two time periods (time 1 and time 2) on the social interaction behavior of 37 children. Only one difference was found between class composition conditions: children with severe and moderate disabilities used less inappropriate behavior in mixed settings than in unmixed settings. In this study, aptitude was treated as a categorical variable rather than a continuous variable, thus possibly limiting the information the researcher had available to explain the variability of a dependent variable (Pedhazur, 1982).

This review concurs with the summaries of other studies measuring developmental outcomes (Buysse & Bailey, 1993; Lamorey & Bricker, 1993; Odom & McEvoy, 1988): children with disabilities seem to be neither hurt nor helped by being enrolled in programs with typically developing children. Given the few conflicting results, however, there is a question as to whether more intensive treatment of children either by outside therapy (Jenkins, Speltz, & Odom, 1985) or increased teacher attention, curriculum emphasis, and teacher training (Fewell & Oelwein, 1990) might result in increased performance on developmental measures. Given the results of the Cole et al. study, there is a question as to the differential effects of degree of disability on the level of performance in

integrated special education and segregated settings. It is possible that an increased number of typically developing children (mainstreamed setting) could produce even better responses on developmental measures by higher performing children with disabilities, and that lower performing children with disabilities could be more negatively affected. Questions regarding the influence of degree of disability should continue to be pursued.

Social Behavior Outcomes

In this review of studies, 19 comparative studies were identified which reported social-behavioral outcomes (e.g., positive peer interaction) and/or other behavioral outcomes (e.g., inappropriate behaviors). One study reported no differences for children in integrated settings, eight reported mixed outcomes, nine reported positive outcomes, and one reported negative outcomes. The studies with social-behavioral outcomes varied widely on a number of dimensions: for example, type of disability, ratio of children with disabilities to typically developing children, group size, size of subject pool, adult-child ratio, length of time children had known each other, curriculum approaches, and the type of measures used to gather information. This review of the comparative studies will examine some of these variables and evaluate the role of mediating variables on the performance of children with disabilities in integrated and segregated settings. Of special interest will be the consideration of the variables of size of subject pool, type of disability, teacher attention, and group size differences between segregated and integrated settings.

Study with No Differences. In addition to evaluating developmental outcomes, the study by Rule et al. (1987) also investigated the effects of segregated and integrated settings on the social behavior of children with disabilities. The purpose of this study was to evaluate a social integration program (SIP) for children in mainstreamed settings. The performance of a group of children in the SIP was compared to children in three other settings who had not had SIP: a Head Start program, a segregated program for children with disabilities, and a segregated program for typically developing children. Observations of children interacting with peers and adults were made during free play

and teacher-directed activity for the integrated Head Start and the segregated typically developing settings, and only during teacher-directed activity for the segregated children with disabilities setting (there was no free play time in the latter's curriculum). Teacher and parent ratings of children's social competency were also reported. The comparison of importance here was the comparison of SIP children with children enrolled in the segregated setting for children with disabilities. No differences were found between SIP children and children with disabilities in the segregated setting on any measure except that the non-treated children with disabilities had more interactions with adults during teacher-directed activity. Since there was no free play in the segregated program for children with disabilities, no comparison could be made of social behavior in this situation. Generally, children in the SIP program did as well in mainstreamed settings as children with disabilities did in other settings. No indication of comparison of self-contained to other children with disabilities without training is provided. So while the SIP model may be viable, it is difficult to say whether it is any more or less successful than just placing children in mainstreaming classrooms. The only major differences appear to be in comparison to typically developing children.

Studies with Mixed Results. In a within-subjects design Esposito and Koorland (1989) evaluated the social behavior of 2 children (a 3-1/2-year-old boy and a 5-year-old girl) with hearing impairments enrolled in the same segregated classroom during the school day and in separate integrated day care programs after school. Attempts were made to keep group size (7 children), spatial area, and toy access similar across classrooms. The adults (number is not reported) in each program were asked to supervise and not intervene during play times. Simultaneous observations of social and cognitive play were made during the free play times on two separate occasions, months apart. Results indicated no consistent differences in the level of cognitive play between settings. The most common level of play for both children was functional. Over time, one child played constructively more in the segregated setting while the other child played dramatically more in the segregated setting. Parallel play occurred more often in the segregated setting, and associative play

(one level higher than parallel) occurred more often in the integrated setting. The 2 children demonstrated social play behavior more similar to that of the typically developing children while in the integrated setting. Visual presentation of data (median percentages) is the only indication of level of significance of the differences in behavior between the two settings. There is no indication as to the amount or type of adult attention in any of the settings. An alternative hypothesis for the results, time of day, was provided. Information on 3 typically developing children was provided as a social comparison for the play levels of the children with disabilities. Time of day did not have an influence on the typically developing children. (It should be noted that the typically developing children were engaged in the same group both in the a.m. and p.m.) Though there is an indication that participation in the integrative setting resulted in more associative play for both children, there were other indices (level of play, cooperative play) which did not differ. Child characteristics such as prior level of sociability were also indicated as affecting different responses for each child in the two settings.

Hecimovic et al. (1985) evaluated the generalizing effects of social skills training on 3 children with disabilities when they were returned, on alternating days, to either a segregated or integrated setting. Three children with disabilities identified as low peer interactors in their segregated classroom, and 3 typically developing children identified as socially active, served as subjects. The typically developing children were trained as peer confederates in five 15-minute training sessions with an adult in which they were to do their best to get an adult to interact with them. During the experimental phase, each child with a disability was brought into a room with the matched typically developing peer (same gender) and told to play. A withdrawal of treatment design was used for the training sessions in which confederates were told: (1) not to initiate (only respond) during baseline I; (2) to initiate to peers in peer initiations I; (3) baseline II (same as baseline I); and (4) peer initiations II (same as peer initiations I). Each play session was immediately followed by an alternative placement in one of two generalization conditions: an integrated classroom (peer confederates plus 20 other typically developing children and 2 adults) or their usual segregated classroom (6 additional

children with disabilities and 2 adults). The children with disabilities did increase interactions with peers in structured settings, but the children did not generalize initiation skills from the training sessions to either of the free play settings. There were mixed results regarding the initiations and responses of other children in the generalized settings. Two target children (girls) received more peer initiations and responses in the integrated setting, and 1 target child (boy) received more peer initiations and responses in the segregated setting. Teacher behavior also differed between the settings. Of the total number of initiations to the subjects, two-thirds were directed to children with disabilities in the integrated setting and two-thirds were directed to adults in the segregated setting. It appears that a child's interaction with a child was followed by another child interaction in the integrated setting, while in the segregated setting it was followed by an adult interaction. It is possible that group size and teacher behavior are major mediating variables in this study. The integrated setting had more than twice as many children enrolled in the classroom and the same number of adults present. The initiations made by teachers to children with disabilities in a segregated setting may have interfered with peer interactions. These factors together may well have influenced the rate of child-child interaction in the segregated setting, where the adults had many fewer children to supervise. Also it should be noted that the target children had previously been enrolled in the segregated setting. The integrated setting was new to them. How they interacted may have differed somewhat between settings based on familiarity alone.

In a study by Guralnick (1981b), the impact of an integrated setting (typically developing children and children with mild, moderate and severe disabilities) and a segregated setting (typically developing children and children with mild disabilities as one group, and children with moderate and severe disabilities as another group) on the social participation, constructiveness of play, and communication of children with disabilities, was evaluated in a within-subject comparison. Twenty-five children with disabilities and 12 typically developing children participated in mixed play (equal representation from all four developmental levels) three days per week, and unmixed play (mild and

typically developing vs. moderate and severe) two days per week. Each mixed group contained the same number of children (the total number was divided equally between the two classrooms) while unmixed groups enrolled 21 (9 mild and 12 typical) and 16 (5 moderate and 11 severe) children. The adult-child ratio was 1:4 for severe and moderate, and 1:5 for the mild and typically developing. Activities and toys were also similar. A number of significant differences were found between developmental levels. The patterns of social participation between mixed and unmixed play were very similar. The only significant effect of integration was less inappropriate play for children with severe disabilities in the mixed condition as compared to the unmixed condition. As mentioned earlier (summary of developmental outcomes), the lack of findings might have been due to the use of aptitude as a categorical variable rather than a continuous variable. Categorizing aptitude is an acceptable process in special education for determining eligibility for service, but this process may be masking treatment effects in research because of wide variability encountered in any one disability category.

In the Jenkins, Speltz, and Odom (1985) study described earlier, social measures were also recorded. Social interaction behavior was observed and recorded in two different settings: (1) the classroom during free play, and (2) during a peer entry situation at the beginning of the year and then again at the end of the year. In the peer entry situation, each child with a disability was observed in a short interaction with a typically developing child. Free play observations indicated no differences in the social behavior interactions of children with disabilities between the segregated and integrated classrooms. In the posttest peer entry situation, children with disabilities from the integrated setting interacted more than the children from the segregated setting. Since the typically developing children in this situation were the same as those in the integrated classroom, familiarity with peers was offered as a possible explanation for this difference.

In the Jenkins, Odom, and Speltz (1989) study (also mentioned earlier), social interaction observations were recorded on children with disabilities in each of the four conditions: integrated with social

interaction play (children were assigned to groups and rotated through activities by the teachers), integrated with child-directed play (children were allowed to choose playmates and/or activities), segregated with social interaction play, and segregated with child-directed play. Social observations were recorded on two occasions with a two-month period in between. Results on segregated and integrated comparisons indicated no differences in social interactions with peers or in teacher-child interactions. There was less isolate play in segregated settings. The major difference involved the kind of play. The social interaction play condition produced the most difference, with children in the social interaction play setting interacting more with one another than in the child-directed condition.

In a study by Vandell et al. (1982), the social interaction behavior of 16 deaf and 16 hearing children (all of normal intelligence) was investigated. These children were all from the same building, and though assigned to segregated classrooms, were grouped in integrated special education or mainstreamed situations on a daily basis. For purposes of this research, children participated in dyads: Hearing treatment child (HT) with Hearing control child (HC); Deaf treatment child (DT) with Deaf control child (DC); HT with DT; HT with DC; HC with DT; and HC with DC. In the two treatment conditions, hearing children were exposed to a series of sessions introducing them to information about deaf children plus some "buddy" interaction with deaf children (the treatment for the deaf children). In the control condition, children were placed together with no intervention. Pretest observations were made followed by two sets of posttest observations. HT children interacted less and for shorter durations with deaf children than did HC children. DC children did not differ from DT children in the number of initiations. Dyads containing deaf children (DC or DT) and HC children actually showed a greater number of successful initiations than those containing HT children. Generally, hearing children did not seem to respond to intervention. Deaf and hearing children both interacted more frequently and for longer durations with children like themselves. The authors of the study express concern that these results may not generalize to other settings since the dyads were "forced."

Fenrick, Pearson, and Pepelnjak (1984) investigated the play of children with disabilities enrolled in both integrated and segregated settings (within-subject design). Six young children 6-7 years of age, with a variety of disabilities, attended the same afternoon transition class (which enrolled 12 children with disabilities), and different morning integrated preschool or kindergarten programs (which enrolled between 20 and 30 typically developing children). In both settings, during free play, the children were free to choose activities, and adults were to be only responsive to children and not initiate or facilitate play. The settings varied in size, activities, and other ecological variables. The number of adults in each classroom is not mentioned. In integrated settings, children with disabilities showed significantly higher intervals of "no play" (watching or transitioning), significantly lower amounts of solitary play, similar amounts of parallel play, lower amounts of cooperative play, and somewhat lower amounts of teacher attention than they did in the segregated setting. From descriptions, there was much variability in performance between children. The integrated setting did not seem to produce major differences in the social behavior of the children with disabilities. No differences were indicated on several additional measures, including a sentence-scoring language measure and an observation-of-attending measure. Given the differences in number of children available in each setting and the unknown number of adults, it is difficult to analyze the possible effect of mediating variables.

In a within-subjects study, Durback and Pence (1991) compared the language production skills of 5 young children with disabilities (aged 3-4) in segregated and integrated settings. They evaluated the initiations, responses, imitations, MLUs, and number of different words used by the children while the children participated in both teacher-structured and free play environments. Programs considered to be segregated (specialized) included a totally segregated classroom and an integrated special education type of setting containing 25% or fewer typically developing children. Both of these classroom types were located in one specialized treatment center. The integrated classroom was located in the community and contained 90% or more typically developing children. Each child in the study was enrolled in one of the

specialized programs and in one of four mainstreamed community-based centers. The adult-child ratio was higher in the specialized setting (1:3) than in the integrated setting (1:6-10), and group size was lower in the specialized settings (12) than in the integrated setting (25). Frequency counts of utterances were made for each child in each kind of setting, under both the adult-directed and free play settings, and analyzed using randomization tests on combined scores and constructed Z scores (segregated classroom scores were the baseline referent). Three of the children were verbally more productive in the segregated setting during free play periods and more verbally productive in the integrated setting during the teacher-directed activity. One child performed better overall in the segregated setting and another child performed better overall in the integrated setting. There was considerable variation in individual performance which resulted in an overall effect of no differences. In addition, there was some indication that the higher adult-child ratio in the specialized setting may have influenced the outcomes by providing more input to children both quantitatively and qualitatively.

Studies with Positive Outcomes. Field, Roseman, De Stefano, and Koewler III (1981) evaluated the play behavior of 16 children with disabilities and 18 typically developing children, observed while playing as separate segregated groups and as a combined integrated group on an outside playground. The children represented both genders, several ethnicities, and were mostly middle class. The children with disabilities averaged the same age as typically developing children (3 years old) but the mental age of the typically developing children was approximately 10 months higher. One group of typically developing children or children with disabilities (segregated condition) played for a period of time, to be later joined by the other group (integrated condition). After playing together, the first group left, leaving the second group alone (segregated condition). The first group out each day alternated between children with disabilities and typically developing children. Time sampling procedures over a period of one semester were used to measure the social play behavior of the children. Teacher behavior was also recorded; however, teachers' roles in the groups were not clearly defined. During the integrated time, children with disabilities looked at and spent more

time in proximity to the typically developing peers than they looked at or spent time with other disabled peers in the segregated setting. There were no differences in the proportions of time spent vocalizing, smiling, and touching children in the opposite program. Though group size differences between the segregated and integrated settings is suggested as a possible explanation for the increases in child-directed behaviors in integrated settings, factors such as peer modeling are considered more important. Teacher behavior differed between segregated and integrated settings for children with disabilities. Children with disabilities looked at, touched, and were touched more by their teachers in the segregated than in the integrated setting. While the segregated groups had been previously established, those in the integrated groups were not previously familiar with one another.

In a study by Strain (1984), the verbal and gestural social skills of 6 preschool-aged boys with autism were evaluated in five different play settings: (1) individually with a confederate in a nontrained baseline setting (the first 10 days of the study) and in a trained intervention setting (the second 10 days of the study), and concurrently in four generalization settings which followed each initial nontrained or trained session; (2) with 6 classmates in their indigenous setting; (3) with 6 boys with disabilities from a separate segregated classroom; (4) with 6 typically developing kindergarten boys; and (5) with 6 typically developing boys who had been instructed by their teacher to attempt to get the children with disabilities to play with them. Across the 20 days of the study, the only adult behavior permitted was to prompt (four times only) children with disabilities to encourage interactions during the nontraining and training session. The range and mean number of percentage of intervals containing social interactions was presented for each subject. A graph is presented of the average percentage of intervals engaged in positive social interaction. No further analysis is indicated. The two integrated settings show the highest percentages of social interaction, with the prior trained peer confederate producing the greatest amount of generalization. Of the two integrated setting conditions, the integrated setting with trained peers shows the largest percentage, comparable to the data presented for a group of typically

developing children. It would appear that training does seem to affect the amount and generalization of social interaction with peers. Since information regarding the variability of performance was not presented, it is difficult to say how significant the differences are in performance. The nontrained condition (10 days) was followed by the trained condition (the next 10 days). If the study conditions had lasted more than 20 days, a different pattern might have eventually evolved. It is also possible that these results are generalizable to children with autism only.

In a within-group design study, Beckman and Kohl (1987) compared the social interactions of 5 children with disabilities and 6 typically developing children in integrated and segregated preschool settings. Children spent the morning hours in their respective segregated programs, while in the afternoon 3 typically developing children joined the two segregated classrooms to form integrated groups. Physical layout of the classroom, types of activities and number of adults (minimum of 2) was similar across settings. Adult-child ratio differed somewhat with 9 children in each segregated classroom of children with disabilities, while the segregated classrooms with typically developing children and integrated classrooms conditions enrolled a total of 12 children. Dependent variables included the number of positive interactions (adults and peers) and type of play. Results indicated that children were engaged in more positive interaction with children and adults in integrated groups than in segregated groups. Type of play with objects was not significantly different as a function of setting. In a closer look at the mean number of interactions with various partners (peers or adults) I found an interesting pattern. When adult attention was higher, peer interactions were lower. This was true for children with disabilities in the segregated group and typically developing children in the integrated group. Adult interactions were generally higher for children with disabilities than for typically developing children, with the highest frequency in the segregated condition. Having fewer children in segregated classrooms may have undermined the number of possible positive peer interactions.

In a within-subject design study, Guralnick and Groom (1988) evaluated peer interactions (both group and individual) and cognitive

levels of play of children in mainstreamed and segregated settings. Eleven boys with mild disabilities and 48 typically developing boys participated. Of the typically developing children, 24 were same-age playmates and the other 24 were younger playmates (one year younger). Over a period of two years, 8 integrated play groups were formed, each composed of 3 same-age typically developing peers, 3 younger typically developing peers, and 2 children with mild disabilities. Each group was studied for four weeks during a daily two-hour free play. The behavior of each child with disabilities was recorded in his ongoing segregated classrooms three weeks following his involvement in the group. The integrated playgroups and the segregated classrooms were similar with respect to both size and adult-child ratio. Social participation and cognitive behavior as well as individual social behaviors were recorded. On the social participation and cognitive measures, children with disabilities showed significantly higher frequencies in segregated settings for transitional and adult-directed behaviors. Though there were no differences in the number of dramatic play intervals (low in both settings), constructive play occurred significantly more in the integrated play groups. In the individual social behaviors, children with disabilities were significantly more interactive in the integrated setting (both positive and negative). The numbers of social behaviors judged to be successful and the amount of group play did not vary between the two settings. It should also be noted that children with disabilities chose to interact more often with same-age typically developing children. Other than placement with typically developing children, possible alternative explanations for the differences in the performance in different settings include the presence of same-age peers and the influence of adult attention in the two settings. In most integrated settings, typically developing children are approximately one year younger than children with disabilities. The performance of children with disabilities with same-age peers as compared to younger peers in this study may have had a major effect. Also, the children with disabilities in segregated settings were involved in adult-directed activities to a much greater extent, possibly producing a different response pattern to adults between the two settings and possibly resulting in a lower response to peers.

Carden-Smith and Fowler (1983) investigated the rates of inappropriate social behavior of young children with disabilities enrolled in both specialized (segregated) and regular classrooms (integrated). Six children with various disabilities and 5 typically developing children served as subjects. In addition to specialized treatment classes, 4 of the children with disabilities were enrolled in half-day regular kindergarten classes while the other 2 children attended special preschool classes. It should be noted that the 5 typically developing children were also enrolled in the kindergarten programs. Preschool and kindergarten classes were somewhat similar in size (10-18 children) but the number of teachers varied (preschool had 3-4 teachers and the kindergarten had 1-2 teachers). Data were recorded on teacher attention, inappropriate child behavior, and non-participation for each child. Activity structure was recorded on group size, teacher presence, group interactiveness, and teacher-paced versus child-paced direction of activity. Children with disabilities displayed more inappropriate behavior (e.g., rule infractions, aggression, teacher non-compliance) than typically developing children. Children with disabilities and typically developing children differed in the amount of inappropriate behavior but the distribution across categories was similar: for example, all children directed a similar percentage of aggressive acts to peers and committed a similar number of rule infractions. Teacher attention was much higher for referred children (two to four times), especially when referred children were enrolled in specialized programs. A positive relationship exists between rates of inappropriate behavior and teacher attention to inappropriate behavior. There was considerable individual variability in the behavior of each child, indicating further the need to evaluate the effectiveness of mainstreaming for each child.

In an extensive study, Novak, Olley, and Kearney (1980) investigated the social skills of children with disabilities in integrated and segregated preschools. Over a period of three years, observations were made in five different preschool settings. The programs varied considerably with respect to subject, teacher, environment, and schedule variables. Two of the five programs were segregated. Children with disabilities were matched to typical kids on the basis of gender, age, and

socioeconomic status. The kinds of disabilities varied from one program to another (e.g., hearing impaired in one class and behavior problems in another). The results of comparisons between subjects on the effects of such variables as integration, teacher presence, and type of play setting were based on data gathered from varying combinations of two of the five programs. In general, children with disabilities played less with other children, initiated and received less social interaction, and received more teacher direction than typically developing children. Setting appeared to influence social behavior for both typically developing children and children with disabilities. In response to the question of integration, in a comparison of two preschools, one segregated (N=9) and one integrated (N=16, 8 children with disabilities and 8 typically developing children), children with disabilities appeared to be more similar in their behavior to typically developing children in integrated settings than in segregated settings (mean frequencies were compared). In two different programs, the effects of teacher presence were noted and compared. The presence of a teacher had effects on the social behavior of children and this interacted with setting and disability. Generally, children with disabilities were less passive and interacted more with peers when the teacher was in the room. Though this study suggests that children with disabilities behave somewhat more like typically developing children when in an integrated setting, the variability between classrooms leaves questions about the generalizability of this research. Group size and adult-child ratio differences raise questions regarding the possible influence of mediating variables. In addition to variability, though the frequency data visually demonstrates differences there is no statistical evidence presented to support significant differences between the two conditions. The combination of teacher-presence effects and group size (more children in integrated) may affect interactions in the integrated setting.

In a between-subjects study, Federlein, Lessen-Firestone, and Elliott (1982) evaluated the social interaction and play behavior of 30 children with varied disabilities, half of whom were enrolled in segregated programs and half in mainstreamed programs, and 15 typically developing children from mainstreamed classrooms. Observations were

made on each child during two 45-minute free play times, gathered four months apart. Generally, there were no differences between children with disabilities in mainstreamed classrooms and typically developing children. There were significant differences between children with disabilities in mainstreamed and segregated classrooms on measures of solitary play, parallel play, and adult initiating behavior, with the more advanced behaviors in favor of the mainstreamed children. Play complexity was close to significance. No differences existed in the more sophisticated associative and cooperative behaviors. It is reported that the behavior of teachers may have been influential. Teachers in segregated classrooms directed the play of children with disabilities more often than in mainstreamed classrooms. The different training of regular teachers and special education teachers, and/or the need of teachers to direct the play of children with disabilities when typically developing role models and play partners are not present are offered as explanations. It is difficult to evaluate this explanation without information about the adult-child ratio in the classroom, accompanying group size, amount of play time, activities, and other ecological variables. If classrooms were of similar size and possessed similar adult-child ratios, those explanations would be relevant.

The following two studies indicated positive outcomes for integration, but it should be noted that in both studies the positive outcomes reported were due to the combination of the behavior of children with disabilities and typically developing children. This procedure differs substantially from other studies, in which the analyses focused only on the outcomes of children with disabilities.

The purpose of the Martin, Brady, and Williams (1991) study was to evaluate the effects of toys on the social behavior of children enrolled in either integrated or segregated groups. Twelve pre-kindergarten children with a variety of disabilities were randomly assigned to two segregated groups of children, and 6 were randomly assigned to two integrated programs (3 in each group). Six typically developing children were randomly assigned to the two programs, 3 in each class. Each segregated and integrated group was assigned to one of two conditions: play with isolate toys or play with social toys. Posttest-only measures of

social (verbal, motor/gestural, or combination; and adult behavior) and isolate behavior were used to test the significance of the toy condition. During the five consecutive days in which the study took place, children were allowed to play for 20 minutes per day. Adults did not initiate to them nor respond to their initiations. Amount of social behavior was collapsed across categories for analysis. The combined social behavior of all children in each toy condition was significantly greater in the integrated setting than in the segregated setting. There was more social behavior associated with social toys than with isolate toys. Overall, there was more social behavior in the integrated social toy environment. It should be noted here that the behavior of children with disabilities was not separated out for the analysis of the integrated condition. Seventy-seven percent of the social behavior recorded was for typically developing children. The significant increase in social behavior in integrated settings could well be accounted for by the typically developing children. The authors suggest that children with disabilities may benefit from the greater amount of interaction experienced by being in the integrated setting. The information provided to support the effects on children with disabilities is reported as number of intervals, with no formal significance applied to them. For example, a difference of 14 intervals of social behavior of children with disabilities while playing with isolate toys and 20 intervals of social behavior with social toys is reported as positive and very desirable. Additional analyses of this information provided the following average rates of interaction/child with disabilities. Means for the four conditions were: 5.3 for the segregated isolate toy condition, 9.6 for the segregated social toy condition, 4.6 for the integrated isolated toy condition, and 6.6 for the integrated social toy condition. Later it is also mentioned that increases in social behavior in the integrated setting were primarily due to changes in motor behavior and not verbal or combined verbal-and-motor behavior. This is important information to consider when deciding what are important behaviors to use in deciding levels of social interaction. Adult behavior occurred a total 18 intervals across conditions, but more specific information was not provided.

Beckman and Kohl (1984) investigated the effects of social and isolate toys on the interactions and play of typically developing preschoolers and preschoolers with disabilities enrolled in integrated and segregated classrooms. An integrated play group (2 typically developing children and 2 children with disabilities) and segregated play group (4 children with disabilities) were assembled randomly from children enrolled in each of two different integrated special education classrooms (N=16). Each of the four different groups of children participated in each of the three conditions involving the presentation of isolate toys, social toys, and a mixture of the two. Peer interactions and toy play were recorded for each child during two observations with each toy condition. Totals of frequencies of interactions were recorded for each condition. The totals represented a combination of the data of 4 children with disabilities in the segregated condition, along with the 2 typically developing children and 2 children with disabilities in the integrated classes. Generally, children in the integrated classes interacted more than children in the segregated classes, except in class II, where both groups interacted equally in the mixed toy condition. When data was collapsed across toy conditions, children in segregated settings played more with toys than children in integrated groups. Since the children with disabilities accounted for 33% of the intervals in class I, and 44% of the intervals in class II, it is evident (and reported) that the typically developing children accounted for much of the increase of play in the integrated condition. In a further analysis of the data, I figured an average number of interactions/child with a disability by dividing the number of intervals of social interaction assigned to children with disabilities for each condition (I divided by four for segregated groups and by two for the integrated groups). The averages were 33.25 for class I segregated, 22 for class I integrated, 24.25 for class II segregated, and 23.5 for class II integrated. The average frequency of interaction for children with disabilities in segregated classes was equal to or greater than the average frequency for children with disabilities in the integrated settings. This study establishes the value of the use of social toys for encouraging children to play but still raises some question of the effects of integration on children with disabilities.

Studies with Negative Outcomes. Soderhan and Whiren (1985) investigated the effects of a segregated (program for hearing impaired) and integrated (early childhood center) environment on the social behavior of a 4-year-old boy with a moderate-to-severe hearing loss. Information was recorded during three different conditions: (1) baseline during an unstructured free choice play time; (2) intervention consisting of intense discussion--with the entire staff of both settings as well as the parents--regarding the child's strengths, needs, and suggestions for increasing social skills; and (3) eight weeks later, after no additional discussions between staff(s) and the investigator. During baseline there was much higher peer interaction in the segregated setting than in the integrated setting. The high adult-child interaction appeared to be a major factor. This was reversed during Phase II, and peer interaction increased; however, peer interaction was still much higher in the segregated setting and teacher attention was still higher in the integrated setting in both Phases II and III. It is noted in the discussion that this child was a "leader" in the segregated program and was at the "bottom of the heap" in the integrated setting. The authors felt that there was little awareness between settings and staff as to the overall daily ecological influences on the child, and that this presented problems in developing an overall program for the child.

Summary of Social Behavior Outcomes Review

In contrast to the relatively consistent pattern of results for developmental outcomes, the social behavior outcomes for the comparative studies present a more complex series of patterns. This is due to the intimate role played by mediating variables in a social situation. This summary provides information on those variables which varied considerably across studies but were controlled within studies, and appeared to exert little influence on the status of the final outcomes. Some mediating variables, which differed between and/or within studies, have been identified as playing an important role in the direction of the outcomes in the studies.

Six variables were well controlled in most of the studies: curriculum; activities; spatial layouts; measurement tools; number of observations recorded; and gender, ethnicity, and age of subjects. An

additional three variables were inconsistently mentioned in each study: role of adults, familiarity of peers, and the ratio of children with disabilities to typically developing children. These variables, when indicated, did not have a consistent relationship with the studies' outcomes.

Curriculum, Spatial Layout, and Activities. Curriculum, spatial layouts, and activities of each of the reviewed studies was maintained in both the segregated and integrated settings. Where there were differences, they were planned (e.g., social and isolated toys in Martin et al., 1991, and Beckman & Kohl, 1984; teacher-directed vs. child-directed curriculum in Jenkins et al., 1989), and represented equally in both segregated and integrated settings.

Gender. Most of the studies balanced the representation of males and females, with more males than females in each setting, but there were some differences. Guralnick and Groom (1988) studied only males, and the balance of males and females was reversed in the Federlein et al. (1982) study.

Age. The children with disabilities ranged in age from 3 to 7 years. Most studies included a mixture of ages. Few had a limited age range (Fenrick et al., 1984, studied children aged 6.3 to 7). The gender and ethnicity of typically developing children was rarely provided; they ranged in age from 3 to 5 years.

Measurement Tools and Number of Observations. The measurement tools and number of observations in each study varied considerably across studies. Even when the same observation tools were used, they were modified for each study. For example, the social behavior scales by Parten (1932) and the play scales by Smilansky (1968) were used in a modified form in several studies (Esposito & Koorland, 1989; Guralnick, 1981b; Fenrick et al., 1984; Federlein et al., 1982). The number of observations in the studies varied from as few as two observations recorded four months apart (Federlein et al., 1982), to an average of 190 observations/child over a three-week period (Jenkins, et al., 1989).

Classroom environments as a whole (e.g., materials, activities, adults, children) are very complex, making it difficult to predict from one

day to the next what will happen in any one child's interaction with others. As a result, observations of these interactions in the classroom raise a number of concerns. Children's behavior can vary enough from day to day to raise questions about its overall reliability and validity. This variability in behavior may contribute to the findings of no differences in many of the comparative studies even though internal reliability and validity may be strong. The random error may be reducing the likelihood of finding differences.

There is one measurement issue which should be noted. Most of the studies separate the performance of the children with disabilities from that of the typically developing children. Two of the studies present data which combine the performance of the typically developing children with that of the children with disabilities for the integrated settings (Martin et al., 1991; Beckman & Kohl, 1984). For the purposes of comparing the performance of children with disabilities in each of these settings, it is important to separate out their performance from that of their typically developing peers. This is especially important since it has been noted in a number of studies (Strain, 1984; Beckman & Kohl, 1987; Field et al., 1981; Guralnick & Groom, 1988; Novak et al., 1980) that typically developing children are significantly more interactive than children with disabilities. A closer look at these studies revealed that the average amount of social interactions/child for children with disabilities are the same or less than that of their peers in the comparable segregated settings.

Role of Adults. Few studies provided information on the role of adults. When mentioned, these roles included monitoring (Strain, 1984; Esposito & Koorland, 1989), staying out of the groups (Martin et al., 1991), using a specific curriculum approach (Jenkins et al., 1985; Rule et al., 1987; Soderhan & Whiren, 1985), and being present but only responsive to children (Guralnick & Groom, 1988; Fenrick et al., 1984). Though no relationship was detected between the roles mentioned and the outcomes of the studies, it is important to note that these studies provided little information about any efforts to monitor the fidelity of adults to the roles assigned.

Familiarity with Peers. Familiarity of children with one another in a group varied somewhat between and within studies, but did not appear to differentially influence outcomes. Some groups were previously established--children had interacted with each other for a period of time prior to the investigation (Jenkins et al., 1985; Jenkins et al., 1989; Beckman & Kohl, 1987). Some groups were formed for research purposes only (Guralnick & Groom, 1988; Beckman & Kohl, 1984); and others contained previously established segregated groups which were to be compared with newly established integrated groups (Field et al., 1981; Hecimovic et al., 1985). Often in the mainstreamed classroom, typically developing children in the integrated groups had previously established relationships and no familiarity with the newly integrated child(ren) with disabilities. No detectable patterns of results were found. The nature of young children's relationships may account for this finding. Young children often change playmates from one day to the next, choosing an activity and playing with the children present rather than choosing to play where certain children play. It is possible that the measures used to evaluate the social interactions may not have been sensitive enough to detect differences based on familiarity. Though some studies mentioned the degree of familiarity between subjects, it was not a condition of comparison in any one study. The lack of pattern of results may be due to the variety of different studies confounded by the multiple influences of social behavior.

Ratios of Children with Disabilities to Typically Developing Children. The ratios of children with disabilities to typically developing children varied considerably in the integrated settings: 1:1 to 1:26 for mainstreamed settings, and 2:1 to 3:1 for the integrated special education settings. Though no consistent pattern could be detected related to the balance of children with disabilities and typically developing children, there was so little consistency across studies that until studies are completed which compare results of mainstreamed and integrated special education settings, any conclusion would be premature.

Typically Developing Children. Specific information on the typically developing children was not always provided in the studies.

Generally, when reported, the data on typically developing children indicated that they interacted more frequently than their disabled peers and required less teacher attention (Strain, 1984; Field et al., 1981; Beckman & Kohl, 1987; Guralnick & Groom, 1988; Novak et al., 1980). By comparison, they were usually an average of 10 to 12 months younger than their peers with disabilities, but there were some differences. Several studies included same-age typically developing peers (Guralnick & Groom, 1988; Field et al., 1981), and one study included older typically developing peers (Hecimovic et al., 1985).

Variables with a mediating effect on the efficacy of mainstreaming include: studies with larger subject pools, specific types of disabilities, and differing group sizes and amounts of teacher attention.

Number of Subjects. The number of subjects with disabilities studied varied from an N of 1 (Soderhan & Whiren, 1985) to an N of 56 (Jenkins, Odom, & Speltz, 1989). Studies with subject pools larger than 25 children with disabilities did not show significant positive social-behavior outcome differences between the interactions of children with disabilities in the segregated and integrated classrooms (Guralnick, 1981b; Jenkins et al., 1985; Jenkins et al., 1989; Federlein et al., 1982). Perhaps children's individual social interaction patterns vary enough that when grouped together, the variability reduces the possibility of finding a particular pattern.

Type of Disability. Most of the studies included a mixture of children with mild to moderate disabilities, and some included children with severe disabilities. Several of the studies focused on particular disabilities, such as hearing impairment (Esposito & Koorland, 1989; Vandell et al., 1982; Soderhan & Whiren, 1985), and autism (Strain, 1984). All but one of these studies (Vandell et al., 1982) indicated positive social-behavioral outcomes for integration or segregation. Two of the studies favored integration (Esposito & Koorland, 1989; Strain, 1984; Novak et al., 1980) while one favored segregation (Soderhan & Whiren, 1985). In contrast to what may happen with the increased N size mentioned before, isolating particular disabilities may help to reduce the variability in the performance that is seen in studies of social behavior of children with many different disabilities. Specific disabilities

may bring with them a set of behaviors (e.g., hearing impaired children have identified communication problems) that may well interfere with their social interaction patterns with others. The assumption that all children with disabilities are somehow similar and can be considered a homogeneous group in research may be a dangerous one to make. Previous research has indicated that children with different levels of disability do perform differently in social interaction with others (Guralnick, 1981b). Though this assumption is being challenged by studies of developmental outcomes (Cole, Dale, & Mills, 1992; Cole, Dale, Mills, & Jenkins, 1993), there is little indication of pursuit of information in the area of social interaction research.

Teacher Attention and Group Size. Teacher attention is another variable which has been identified as influencing children's social behavior in individual studies of mainstreaming. The variable has gone unmentioned in the majority of studies of mainstreaming even though it represents a possible confound with variables of group diversity in some studies. Teacher attention manifested itself in several different ways. Adult-child ratios varied considerably, from as low as 1:4 to as high as 1:13. The variability in this factor resulted from decreased group size or increased number of adults in segregated settings, and resulted in an increased opportunity for adults to interact more frequently with children (Field et al., 1981; Hecimovic et al., 1985; Fenrick et al., 1984; Carden-Smith & Fowler, 1983). In all of these studies, greater amounts of teacher attention (physical and/or verbal) were delivered to children with disabilities in segregated settings as compared to integrated settings. In three other studies, the increased amount of teacher attention could be accounted for by a larger amount of adult-directed activity in the segregated programs (Guralnick & Groom, 1988; Rule et al., 1987; Federlein et al., 1982). It is possible that both quantity (group size) and quality (adult-directed) of teacher attention can have a mediating impact. Several other studies also mention teacher attention as a possible explanation for results. The results of increased social behavior favoring the segregated setting in Soderhan and Whiren (1985) was explained by the higher amount of teacher attention in the integrated setting. The attention interfered with the social behavior of

the child in that setting. In fact, when teacher attention was decreased, the child increased interactions with peers in the integrated classroom. In the study by Beckman and Kohl (1987), the amount of teacher attention averaged across the four observations was much higher for the segregated group of children with disabilities. In addition, there seemed to be a relationship between higher teacher attention and lower peer interaction for one of the segregated classes and one of the integrated classes. Guralnick (1981b) also mentions that the lower functioning children received more attention from the teachers during the integration sessions.

Overall Review Summary

Developmental and social behavior outcomes for children with disabilities do not vary as a function of level of integration. The strongest evidence supporting mainstreaming shows only limited and mixed results which can be explained by other factors, like weak research designs and the presence of confounding variables such as adult-child ratio, quality and quantity of teacher attention, and types of disabilities. Once confounding variables are identified and controlled, it appears that the presence or absence of typically developing children in the classroom makes no difference.

A previous study by Cole et al. (1991) may help explain these findings of no benefit of mainstreaming for developmental behavior. In this well-controlled study, the authors investigated the effects of enrollment of children with disabilities in segregated and integrated special education classrooms. While there were no significant differences in developmental outcomes for children in the two settings, there was an aptitude-by-treatment interaction. Children who performed higher on pretest measures benefited more from their enrollment in the integrated special education classrooms, while children who performed lower on pretest measures benefited more from their enrollment in the segregated classrooms. Aptitude-by-treatment interactions may have been present in earlier studies and may explain the findings of no differences. The variance accounted for by the interaction was small, suggesting that care be taken in applying this information when considering program change. It does beg replication, with the addition of a mainstream condition in

which the impact of more typically developing children upon a classroom could be evaluated.

In the pursuit of answers to the question, *How can we successfully mainstream?*, it is obvious that we need to continue to conduct well-controlled, sophisticated, comparative studies which evaluate the effects of mediating variables.

Appendix B: Clinical Implications

There were no overall differences across the three classroom compositions in this study. Young children with disabilities did not show any differences in performance on developmental or social behavior outcomes across segregated, integrated special education, or mainstreamed classrooms. This finding is consistent with previous research and suggests that the presence or absence of typically developing peers does not make a difference in performance of children with disabilities on outcome measures.

The aptitude-by-treatment interactions I found, however, provide an alternative explanation to the interpretation that different compositions do not have differential effects. Children with disabilities who performed lower on pretest measures actually showed better cognitive and language test results after enrollment in the segregated or mainstreamed settings (as opposed to the integrated special education settings). Children with disabilities who performed higher on pretest measures actually showed better cognitive and language test results after enrollment in the integrated special education setting (as opposed to the segregated or mainstreamed setting).

Explanations for the aptitude-by-treatment interactions were sought by examining the social interaction behavior of children designated as lower performing children with disabilities and higher performing children with disabilities. Classroom behavior of lower performing children with disabilities across the different class compositions differed substantially from the performance of the higher performing children with disabilities. Settings altered the size of the difference between higher performing and lower performing children with disabilities, as well as the uniformity of performance across the three settings for the lower performing children with disabilities.

For lower performing children with disabilities, the pattern of isolate/unoccupied play mirrored the pattern of achievement. Lower performing children with disabilities engaged in much more isolate behavior in the integrated special education setting than in mainstreamed or segregated settings. Increased teacher attention (not

significant) in integrated special education may have mediated the aptitude-by-treatment interaction effect by isolating lower performing children with disabilities from the benefits of modeling the activity and language of their higher performing peers.

For higher performing children with disabilities, social interaction did not seem to provide an explanation. Their interactions with peers, proximity to peers, isolation, and teacher attention were comparable across the three classroom compositions. It is possible that their different outcomes were mediated by self-perception. They may have had a higher evaluation of their abilities when comparing themselves to children of similar abilities, while rating themselves lower when comparing themselves to children unlike themselves. This in turn may have had a differential effect on their motivation for learning. Group practices may provide an alternative hypothesis. Teachers in segregated and mainstreamed classrooms may have resorted to more homogeneous grouping, separating lower performing children with disabilities from higher performing children with disabilities in segregated settings, and separating typically developing children from children with disabilities in mainstreamed settings. The higher performing children with disabilities in integrated special education classrooms may have been perceived as closer to the ability of typically developing children than lower performing children with disabilities, resulting in teachers providing more tailored and stimulating instructions to higher performing children with disabilities in integrated special education programs as compared to segregated or mainstreamed classrooms. All three explanations are tentative and in need of further investigation before integrating them into classroom practices.

Implications

The aptitude-by-treatment interaction findings for developmental outcomes are potentially important when considering educational placements for young children with disabilities. The differential responses of children with disabilities to the classroom compositions raises some questions about the current trend in education towards full inclusion. These findings indicate that the integrated special education model is not just a "make do" version of mainstreaming that should be used only when full inclusion is not possible; rather, integrated special

education appears to be a more effective model for the development of cognitive and language skills for a distinct group of children: the higher performing children. Proponents of the inclusion model present it as the only ethical and sound practice. (See Fuchs & Fuchs, 1994, for a comprehensive discussion of the Inclusion Reform Movement.) This study, however, suggests that special education should use caution and consider using more than one "tool" at a time. Translating these findings into practice by offering a continuum of services holds some promise that we can match children with the most appropriate type of classroom composition in order to optimize their school success. Rather than playing rhetorical "king of the mountain" with different models of the least restrictive environment, we might be able to make placement decisions based on empirical evidence.

Another widely accepted assumption is also challenged by this study: the belief that children with mild disabilities are more easily mainstreamed than children with more marked disabilities. Until recently, children with more moderate to severe disabilities have been considered at risk for placement in mainstreamed environments without the provision of a number of resources: adult supervision, careful programming, and close monitoring to insure adequate progress. Children with mild disabilities were considered to be functioning more like typically developing children and thus able to easily model the behavior of typically developing children and learn more effectively in the mainstream environment. These results indicate that full inclusion may be a less beneficial program for the development of language and social skills than integrated special education for relatively higher functioning children with disabilities. This finding may help explain why advocates for children with more severe disabilities have been the most vocal proponents of full inclusion, while professionals serving children with mild disabilities are often more wary of limiting student placements to only the full inclusion model (Fuchs & Fuchs, 1994).

A third major implication of this study is that segregated classes do not appear to offer cognitive and language development advantages over those programs offering the choice of either mainstreamed or integrated special education programs. The earlier findings of Cole et al. (1991) suggested that segregated classes benefit the cognitive and

language development of some children more than do integrated special education classes. That study, however, did not evaluate mainstream classes. My finding that mainstreamed classes offer the same advantages (and disadvantages) as segregated classes for relatively higher and lower functioning groups suggests that all children can have their cognitive and language needs met by placement in either integrated special education or mainstreamed classes. In other words, the advantages (increased cognitive and language outcomes) of segregated classes for children who are relatively lower functioning can be met as well in mainstreamed classes, while the children who are relatively higher functioning can have their cognitive and language needs best met in integrated special education classes.

Summary and Further Consideration of Major Implications

The implications of this study for practitioners are fairly clear. First, there is no evidence that segregated classes offer any cognitive or language developmental advantages for children that cannot be met by offering either integrated special education or mainstreamed classes, depending on the child's aptitude. These results, taken together with legal and ethical considerations, do not support the use of segregated classes.

It follows that districts should be cautious in adopting any one model over another (full inclusion, for the moment) as a single model into which all children must fit. Rather, a spectrum of models that offer a selection--from programs in which children with disabilities are in the majority, to programs in which they are in the minority--should ideally be available.

There are two caveats to these implications. It should be noted that the amount of variance accounted for by composition is small. That is, there is an indication that aptitude of a child (high or low) influences the integration environment from which the child is able to benefit; however, a complete alteration in the kinds of programs offered by any one district based on these results would not be warranted. After all, in this study, children benefited developmentally in all three programs more than would be expected by maturation alone.

Furthermore, the issue of degree of integration may be less critical than consideration of such things as child characteristics and the

quality of the teacher behavior and program activities. Classrooms are dynamic environments, filled with opportunities to interact with different teachers, peers, materials, and activities in a variety of different ways. An organized curriculum, well-educated, caring teachers who know and understand early childhood education and special education service delivery, and access to good support personnel for special classroom services are just some of the factors which may also influence developmental and social behavior outcomes in a positive way. These variables not only need to be further investigated as to their individual influence on classroom outcomes, but also studied in a manner which informs the field of their interaction effects with other variables.

Other Considerations

The recommendations mentioned above assume that school districts have unending resources with which to work, and that they are in complete agreement with the parents and the community regarding how to deliver educational services. There are several factors which may prevent districts from providing a continuum of services and therefore compromise the decision to place a child in a given program: for example, the size of the district, the public provision of services for young children, and the values and belief system of the parent community.

The size of the district influences the number of classrooms available for mainstreaming. A very small rural district may have only two or three young children with disabilities, too small a pool to provide an integrated special education program. Smaller districts like this may need to offer mainstreaming options and provide integrative assistance for the higher functioning children with disabilities in the regular classroom. Larger districts may be able to offer the full continuum of services, but the actual classrooms may be located in other parts of the district, requiring extensive transportation services for the children and making it more difficult for the parent(s) to be in regular contact with the program.

Most of the school districts in this country do not have public education programs available to *all* young children. In fact, only Head Start and special education services are widely available, and these have entrance requirements based on SES level and/or the presence of an

identified disability. There are private day care and preschool programs available in almost every community. School districts often contract with these programs to provide integrative experiences. There is a problem inherent in these arrangements. The program standards and certification requirements vary considerably from one state or area of the country to another. This can result in the provision of services to children by inexperienced and untrained staff. Some districts provide integrated special education programs in which a few openings are provided in the special education classroom for typically developing children from the community. Other districts contract with private centers for typically developing children and provide supportive services (training and/or manpower) to the center enrolling the child with a disability.

A functioning relationship between the schools and parents is critical to the provision of adequate services. Together they must make the decision as to what is best for the child. A district philosophy supporting a broad continuum of services places the district in the most ideal position. Regardless of the integration philosophy of the parents (inclusion or some other form of integration), there is probably an agreeable placement for the child. If a district is restrictive in its philosophy of service provision (e.g., inclusion only), it may be difficult to accommodate the variety of needs of all parents and their children with disabilities in the community. If the school district and community all agree on one program option for all children in the community, that's one thing; however, given the unlikelihood of that happening, it makes more sense for a district to adopt a more flexible position and provide a community with choices.

Perhaps the attention we have given to the issue of integration has led us somewhat astray from the original goal of providing for the educational needs of children with disabilities. It may be necessary to change the focus "from one of maximizing the level of integration of children with special educational needs, to that of optimizing the appropriateness of their education" (Hornby, 1992). With that goal in mind, we might find that more active listening to the needs of children and their families, combined with a continued effort to identify and control important variables which seem to influence the successful

performance of children in the classroom, could yield processes and procedures for establishing environments conducive to learning for all children.

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