The Effects of Three Styles of Teaching on The Psychomotor Performance and Social Skill Development of Fifth Grade Children

by

Michael Goldberger*
(on leave from Temple University)

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ABSTRACT

The effects of teaching styles B, C and E (Mosston, 1972) were examined in terms of the motor skill acquisition and social skill development of fifth grade children. 96 children, randomly selected and randomly assigned to one of three treatment groups, were taught a hockey accuracy task (Skinner, 1974) using these three alternative teaching styles. Performance data were collected prior to, midway through, and following training and were analyzed (1) within treatment groups, to determine if learning was evident, and (2) across treatment groups, to examine the relative effectiveness of these three styles. Social skill patterns, observational data focusing on learner to learner verbal interaction during a second task in which dyads of learners were asked to "help" each other learn the task, were also examined.

A 3x3 ANOVA for repeated measures revealed (1) that all three groups learned the task and (2) that they learned it comparable well. It can be concluede that these three styles are all effective in facilitating learning on this type of algorithmic psychomotor task (Goldberger, 1980). Style C, in which learners work in dyads, one performing the task while being provided with formative feedback by the other, was found not only to produce comparable task learning, it was found also to significantly enhance social skill development; i.e. those specific behaviors associated with giving helpful feedback to, and receiving it from a peer.

Gage (1978) defines teaching as the process of one person, the teacher, attempting to "facilitate learning on the part of another." Learning is viewed as the product of this process and may be inferred from changes in the learner's behavior (Gagne, 1970). Research on teaching which attempts to establish lawful relationships between teaching behavior and learning outcomes falls within the "process-product" paradigm described by Doyle (1978).

For the present process-product study, teaching was defined further by "The Spectrum of Teaching Styles" (Mosston, 1972), a theoretical schema of eight interconnected teaching styles (Styles A through H) all derived from the same decision-making framework. This framework partitions decisions about the teaching/learning transaction into three sets: Pre-impace (planning decisions), Impact (execution decisions), and Post-impact (assessment decisions). Each style has a unique theoretical structure determined by who, teacher or learner, makes which decisions. Decisions systematically shift along the Spectrum to form eight distinct, yet connected, styles, which provide alternative models of teaching/learning behavior ranging along a theoretical continuum from complete teacher to complete learner decision-making (see Figure 1). For example, in Style A, the teacher theoretically makes all decisions. The learner's role, in this arrangement, is to obey.

The value of any style of teaching lies in the conditions for learning and the nature of the interpersonal transaction it provides. A logical analysis of any style leads to conjecture about its probable effects on learning outcomes. No style is generally "good" or "bad." Each, because of its unique structure and the conditions it provides, has associated with it sets of assets and liabilities. It would make sense, continuing with the Style A illustration, to expect routine exposure to the conditions

Figure 1

Overview of

The Spectrum of Teaching Styles*

PRE-IMP.	(T)	(T)	(T)	(T)	(T)	(T)	(T)	(L)	
IMPACT	(T)	(L)	(Per)	(L)	(L)	(L)	(L)	(L)	
POST-IMP.	(T)	(T)	(Obs)	(L)	(L)	(L)	(L)	(L)	
Teacher Maximum									Teacher Minimum
Learner Minimum	A	B	C	D	E	F	G	H	Learner Maximum
	COMMAND STYLE	PRACTICE STYLE	RECIPROCAL STYLE	SELF-CHECK STYLE	SLANTY ROPE STYLE	GUIDED DISCOVERY STYLE	PROBLEM SOLVING STYLE	LEARNER DESIGNED PROGRAM STYLE	

*from Mosston, 1972 (revised in 1980).

provided by this style to enhance, among many other possible outcomes, a learner's compliance behavior; i.e. a learner's ability to effectively follow directions.

Research on the Spectrum

A review of research in which the Spectrum was used to define treatments returns a weak yield of disappointing findings (Dougherty, 1970; Mariani, 1970; Boschee, 1972; Bryant, 1974; Jacoby, 1975; McCleary, 1976; Chamberlain, 1979; Gerney 1979; Virgilio, 1979). These studies, all conducted by graduate students in physical education, should be viewed as pioneering efforts, since they were completed during the early development of both the Spectrum, as a unified theory of teaching, and research on teaching, as a scientific discipline.

Mariani (1970), after studying the effects of Styles A and B on tennis stroke performance, reported that the Style B group displayed significantly better performance on one of the two strokes following the treatment. However, "Style B," as operationalized in Mariani's study, differed from Style B as defined by Mosston. Under Mariani's conditions, the learner had "the authority to decide how many repetitions of a particular task to make." Based on the theoretical structure of Style B (Mosston, 1972), decisions about the "quantity" of performance are made by the teacher.

Dougherty (1970) compared the effects of Styles A, B and D on the development of physical fitness and selected motor skills. His net results indicated no significant differences among the treatment groups following fourteen weeks of training, although different developmental patterns were observed during training. Virgilio (1979) compared the effects of a "direct" strategy (Style B) and Style C on motor skill acquisition and other outcomes. He found no significant differences due to treatments.

Analysis of the conditions for learning provided by Styles A through E suggests that significant differences in development are less likely to be found among these styles, on either psychomotor attributes (Mosston, 1965) or algorithmic psychomotor forms (Goldberger, 1980), then might be expected in comparing Styles A through E against Styles F through H. This appears to be supported both logically and empirically.

McCleary (1976), studying the effects of Styles B and G ("The Problem Solving Style") on skill acquisition and higher order cognitive functioning of kindergarten and first grade children, and Bryant (1974), studying the effects of Styles B and C on skill acquisition and social skill development of middle school boys, found no significant differences. Both of these projects suffered from three common methodological problems: (1) The length and distribution of training was insufficient to produce meaningful effects; (2) The dependent measures lacked reliability; and (3) The same teacher taught one intact group per treatment.

Other Research on Teaching Related to the Spectrum

Studying the effects of teaching in physical education has been a popular activity for decades, yielding a bulky body of information but discouragingly few significant findings (Locke, 1977). An analysis of this literature exposes a number of recurring problems, such as poorly defined treatments, unreliable instrumentation, and weak research designs. These problems raise questions about these studies and make even significant results suspect (Goldberger and Gober, 1978).

Within this literature, however, studies on motor learning have yielded certain consistent results. This research emphasizes the same dependent variable, i.e. psychomotor performance, but instead of focusing on the teaching/learning transaction, the focus is on selected conditions of learning (such as the type and timing of feedback or the disbursement of

practice sessions).

Practice refers to repeated attempts to master a task (Cronbach, 1977) and has been found in combination with other relevant conditions to positively affect learning in both the cognitive (Rosenshine, 1977) and psychomotor (Oxendine, 1968) domains. Style B, by its design, maximizes time for practice. Following the task presentation, learners make nine decisions about their relationship to the task as they engage in the activity. These decisions, which do not affect the task per se, do allow for some personal comfort related adjustments in learning conditions during performance (i.e. pace of work, specific location and posture, starting time, etc). While the learners are practicing, the teacher provides one-to-one feedback to selected learners. This style of teaching is well within the definitional parameters of the direct, teacher-centered, formal, didactic styles described by other writers.

Style C is structurally similar to Style B except that feedback, instead of being given periodically by the teacher, is provided after every practice trial be a peer. This is accomplished by having the learners choose partners. As one partner does the task, the other observes the performance and provides feedback based on criteria supplied by the teacher. Theoretically, not only should performance improve due to immediate feedback, but the social skills involved in giving and receiving feedback from a partner should also be enhanced.

One liability of this style is that, because of its reciprocating procedure, some actual practice time is lost. There is evidence to suggest, however, that mental practice of the kind the observer experiences enhances performance (Nixon and Locke, 1973).

In Style E two more sets of decisions have shifted to the learner. In Styles B and C, feedback about performance was provided by the teacher or

peer. In Style D the learner assesses his/her own performance based on criteria supplied by the teacher. In Style E, in addition to this self-assessment decision, the teacher provides alternative levels of the same task (i.e., multiple levels with varying degrees of difficulty) to offer options for selection of optimal levels by all learners.

The application of this "slanty rope" principle (Mosston, 1972) seems so appealing as to be obvious. Research, however, has generally failed to support this reasoning. In skill learning, providing less or more difficult levels of the same task by manipulating factors within that task (such as target distance, target size, or weight of equipment) has not produced significantly more learning when compared to practicing the actual skills (Nixon and Locke, 1973). On the other hand, a few studies have supported this notion and, despite the concept of specificity of training, the intuitive appeal of the "slanty rope" principle is too great to discard it. This is particularly true for classes of "exceptional" learners and for instruction early in the learning process when the learner typically experiences frustration and self-doubt.

In defining "intrinsic motivation," Deci and Porac (1978) explain that underlying human behavior is a cyclical pattern in which people "seek out and conquer challenges that are optimal for their capacities." If a child is continually subjected, over an extended period of time, to tasks which are perceived as being too difficult, and if participation leads to systematic failure, the child inevitably begins to generalize about his/her inadequacies as a learner. The child who constantly fails at learning tasks and is reminded of this by his/her teachers, classmates, and parents, "must come to view himself with a generally negative self-concept as a learner" (Bloom, 1976).

On the other hand, if a task is provided with multiple levels of

difficulty, as in the case in Style E, the learner may select a level he/she feels is optimal for his/her present capacities based upon personal assessment at that point in time. It is assumed that this kind of arrangement would:

1. Be intrinscially motivating, if the task itself was interesting, thus producing maximum time-on-task behavior.

2. Encourage the development of a positive self-concept as the learner gains competence as a function of decisions he/she is making.

3. Encourage maximum achievement on the task because the conditions for learning are "tailor-made" for that particular learner.

Recent Trends in Research on Teaching

As mentioned above, in general, research on teaching has not yielded significant or consistent findings (Shavelson and Dempsey, 1976; Doyle, 1978). This has led some educational thinkers to suggest that research on teaching should not be counted on to provide helpful solutions to practical problems about education (Ebel, 1968). Within the past ten years, however, a number of process-product studies have reported significant and consistent findings (Brophy and Evertson, 1974; Soar, 1973; Stallings and Kaskowitz, 1974; McDonald, 1976). These were large, multivariate, correlational studies, and the significant results were found nested among other, very influential, variables. Recent experimental work has verified many of these findings (Brophy, 1979). McDonald (1976) asserts that, in general, only about 10 to 50% of the variance in learner achievement can be attributed directly to teacher performance variables. One such influential variable, socioeconomic status, was determined to have profound effects on which kinds of teaching variables affected learner achievement (Brophy and Evertson, 1974). These findings, which seem almost obvious, nevertheless raise the hope that research will contribute in the future to the improvement of teaching.

In a 1976 evaluation of the Spectrum, Anderson and his colleagues from the Laboratory for Cognitive Studies in Education found that: (1) Spectrum teachers appear to give more individual attention, (2) They appear to display less domination in academic discussions, and (3) There appears to be more efficient use made of class time, when compared to a matched sample of non-Spectrum teachers. They conclude "the Spectrum appears to aid teachers in implementing procedures and strategies known to contribute to high student achievement" (Pichert et al, 1976).

Statement of Purpose

The present study utilized an experimental, as opposed to a correlational, design in which the treatments, Styles B, C and E, were employed under laboratory-type conditions to examine their effects on selected learner outcomes. Although its scope was narrow (N=96) when compared to the multivariate studies mentioned above, significant results were anticipated due to a number of methodological considerations:

1. The independent variable (the three levels of teaching style) was defined and verified in behavioral terms. This is in contrast with the poorly defined treatments (such as traditional vs. innovative or teacher-centered vs. individualized instruction) found so often in the literature.

2. The laboratory-type setting and randomization procedures, in contrast with most field-based work, allowed for the control of many extraneous variables typically affecting the treatments (e.g. classroom distractions, differences in intact groups, etc.).

3. The learner achievement measures, which are described below, provided direct measurements of psychomotor and social performance.

Based on an analysis of the theoretical structure of these particular styles of teaching and a review of the relevant literature, hypotheses were formed concerning the relationships of these styles to skill acquisition and social skill development. The major hypotheses were:

1. That (a) all three treatment groups would learn the task and (b) would learn it equally well but (c) exceptional learners, those particularly good or poor performers, would benefit most from the conditions provided by Style E.

2. That low self-concept children would benefit most by the conditions provided by Style E.

3. That social skill development, specifically those behaviors associated with giving to and receiving feedback from a peer, would be enhanced under the conditions provided by Style C.

Method

Sujects for this study consisted of 96 fifth grade children who attended the Myers School, in Cheltenham Township, Pennsylvania , during the Spring of 1979. 48 males and 48 females were randomly selected from 122 volunteer children. 16 children from each subgroup were then randomly assigned to form three treatment groups each consisting of 32 individuals. Over the previous three months they had been exposed to selected episodes using the Spectrum of Teaching Styles as a normal part of their regular physical education class.

This study employed a pretest/posttest/control group design (Campbell and Stanley, 1963) in which the Style B group served as the control group (Fitzgibbon and Morris, 1978). The children learned a psychomotor accuracy task under the three experimental conditions. Training consisted of 60 treatment trials, divided into two 30 trial practice sessions. (During pilot work sets of 60 trials, under Style B conditions, were found to produce significant learning).

Psychomotor performance was measured by scores on a hockey accuracy task (SHT), adapted from Skinner (1974). The task involved shooting a puck into a target area calibrated to yield scores ranging from 0 through 30. Knowledge of results, a major factor underlying these treatments (i.e. the post-impact decisions), was controlled by placing a screen

between the child and the target area. Accurate knowledge of results was provided by use of a chart. Performance data were collected at three points during the training period (i.e. prior to, midway through, and following training) to document the effects of the differential treatments.

Prior to training children in both the Style B and the Style E groups completed two paper and pencil self-concept instruments, the Piers-Harris Children's Self-Concept Measure (Piers, 1969) and the Florida Key (Purkey, Cage and Graves, 1973), which would allow examination of any differential effects of training for low and high selfconcept individuals. The Piers-Harris instrument is an 80-item forced choice questionnaire which was reported to have a reliability coefficient of .77 with fifth grade children (Wing, 1966). Approaching the measure of self-concept from a different perspective, teachers utilizing the Florida Key, rated the self-concepts of the learners under their charge.

A third, computed, measure of self-concept was also obtained. After the children finished their practice trials and posttest trials on the SHT, they were asked to predict their average score, based on their past experience, over an additional ten test trials. Their prediction was called the Predicted Score (PS). They then completed those additional ten trials. The score on each trial was subtracted from the PS and summed across the ten trials yielding a discripancy score (DS) which was considered another measure of self-concept.

The reason for collecting three very different measures of self-concept was a concern for the construct validity of this variable. These three measures should be found to correlate, at least marginally, with each other. Low and high self-concept subgroups were formed by taking those children with scores beyond a half standard deviation above the mean (high self-concept) and those with scores a half standard deviation

below the mean (low self-concept) on each of the three measures.

This same bifurcating technique was employed in forming subgroups of "exceptional" learners in terms of motor performance. Those children scoring a half standard deviation above the mean on the midtest of the SHT were placed in the "high skill" group, those scoring half a standard deviation below the mean were placed in the "low skill group." Again, these subgroups were formed to examine the differenctial effect of the treatments on these different types of learners.

Spectrum theory would suggest that these types of learners would probably do better, or least have a better opportunity for learning, under the conditions provided by Style E. Under the Style E conditions, it will be remembered, the learner can select the level of difficulty at which the task is to be completed. These conditions would appear to be of particular benefit to both learners who have poor self-concepts of themselves as performers and learners who are, in fact, low in skill or ability. Learners will typically select levels of difficulty which will ensure their success in the task.

Finally, children in the Style B and Style C groups were randomly paired within their treatment groups and given an additional 30 trials using the nondominant hand. (Here performance was not of concern.) They were asked to "help your partner learn this task" during which time the verbal dialogue within the dyad was recorded using a Flanders-like coding system (Goldberger, 1973) by the second teacher (see Figure 3). The purpose here was to characterize the social interaction patterns as the two "helped" each other during this reciprocating experience.

Testing and treatments were administered outside the classroom setting to control for as many extraneous variables as possible. Children were randomly called to the testing area in self-formed dyads (i.e. they

selected their own partners within the same sex group for the training sessions). Information about the task and about the treatment, i.e. descriptions of the role expectations associated with the particular style, were introduced to both of them via Style A and using a prepared dialogue. All the children were reminded of the specific learner decisions appropriate for the treatment group to which they were assigned. Under the Style B conditions, these children were reminded of the sets of impact decisions they were responsible for making (i.e. exact starting time, pace of the performance, interval between trials, etc.). Under the Style C conditions, these children were provided with the feedback format (which is discussed below) and ways of providing helpful feedback. The alternative levels of the task (also discussed below) were explained to the Style E children and time was provided to discuss these options with the teacher.

Under the Style B and E conditions, the children decided who would go first and, while one performed the task, the other waited outside the testing area. They then switched roles and the second one performed the task. Under the Style C conditions, the children also decided who would go first but as one did the task, the other reciprocated by providing feedback as is called for by the style theory. They then switched roles. In an attempt to control the amount of training time across the three treatments, it was decided that the Style C group would receive only 30 performance practice trials on the task, as opposed to the 60 performance trials experienced by the Style B and E groups. Of course, the Style C children would also receive 30 non-performance trials (i.e. mental practice trials(as they assessed their partner's performance and provided feedback.

The teaching behavior of the two instructors was controlled by: (1) Exposing both instructors to rigorous training in Spectrum theory and

practice supervised by Professor Mosston. (2) Observing and assessing the actual teaching behavior of both instructors in natural settings using all styles. This was done both before and following the experiment. (3) Providing verbatim dialogues, developed from the theoretical models, to be used during the training. (4) Observing the two instructors during the treatment sessions to verify fidelity. And (5) randomly assigning instructors to treatments and then switching instructors after each pair of children was treated.

Although the mode of delivery and the amount of feedback differed across treatments, as is dictated by Spectrum theory, the provision for feedback within the three groups was controlled in the following ways: (1) The final location of the puck, i.e. where the puck landed in the target area, was accurately displayed using a standardized chart. (2) Corrective comments, those concerning the direction and force of the shot were uniformly provided. And, (3) positive reinforcement, including such comments as "well done" or "good job" or "you're improving," was again systematically provided.

To simulate as much as possible naturalistic conditions, feedback was provided differentially. To simulate the Style B conditions, feedback was provided following every fifth trial. (This feedback to trial ratio was probably richer than found in most school situations.) Under the Style C conditions, feedback was provided by a partner after every trial. Again, it should be noted, in this attempt to simulate naturalistic conditions the children in the Style C group received only 30 performance trials, 15 during the first practice session and 15 in the second. Finally, under the Style E conditions, the frequency of feedback was selected by the investigators as the factor upon which to base the alternative levels of the task; i.e. the varying degrees of difficulty from which the children could choose.

Under this condition they could elect to receive feedback, i.e. knowledge about their performance, in increments ranging from after every trial to actually electing not to receive feedback at all. As will be discussed later, the selection of this factor as the basis for providing multiple levels for the Style E group proved to create some difficulties.

To determine the effects of these treatments on the dependent variables, data were subjected to the following analyses. Performance data were studied both within treatments, to see if learning took place, and between treatments, to determine the differential effects of the three styles, employing a 3x3 Analysis of Variance (ANOVA) technique for repeated measures with three levels of the treatment and three levels of SHT trials. Comparisons of "exceptional learners" and low and high self-concept subgroups were analyzed by means of independent ANOVAs (Ferguson, 1966; Edwards, 1968).

Results and Discussion

In this section the results of data analysis are presented and discussed in light of both Spectrum theory and relevant literature. The effects of the three styles of teaching on skill acquisition were examined individually and then, to focus more closely on the influence of Style E, were analyzed further in terms of subgroups of "exceptional learners" (i.e. both high and low skilled and high and low self-concept children). Student to student interaction data were analyzed to determine the effects of Style C on social skill development.

Motor Performance Results

Means and standard deviations for the three treatment groups across the three sets of SHT trials are presented in Table 1. A 3x3 Analysis of

TABLE 1

Means and Standard Deviations of Pre, Mid and Posttest SHT Scores for Treatment Groups B, C and E

	Treatment								
	Style B			Style C			Style E		
	N	MEAN	SD	N	MEAN	SD	N	MEAN	SD
Pretest	32	21.32	5.00	32	20.60	5.18	32	19.99	4.70
Midtest	32	24.57	3.04	32	24.16	3.50	32	23.13	3.94
Posttest	32	25.77	2.47	32	25.06	2.72	32	23.74	3.41

TABLE 2

Analysis of Variance of the Three Levels of Trials (Pre, Mid, Post) for Treatment Groups B, C and E

Source of Variation	DF	SS	MS	F
Treatment	2	915.76	457.88	1.10
Error	93	38798.80	417.19	
Trials	2	3996.98	1998.49	92.44**
Interaction	4	12.98	3.24	0.15
Error	282	6097.17	21.62	

** $p < .01$

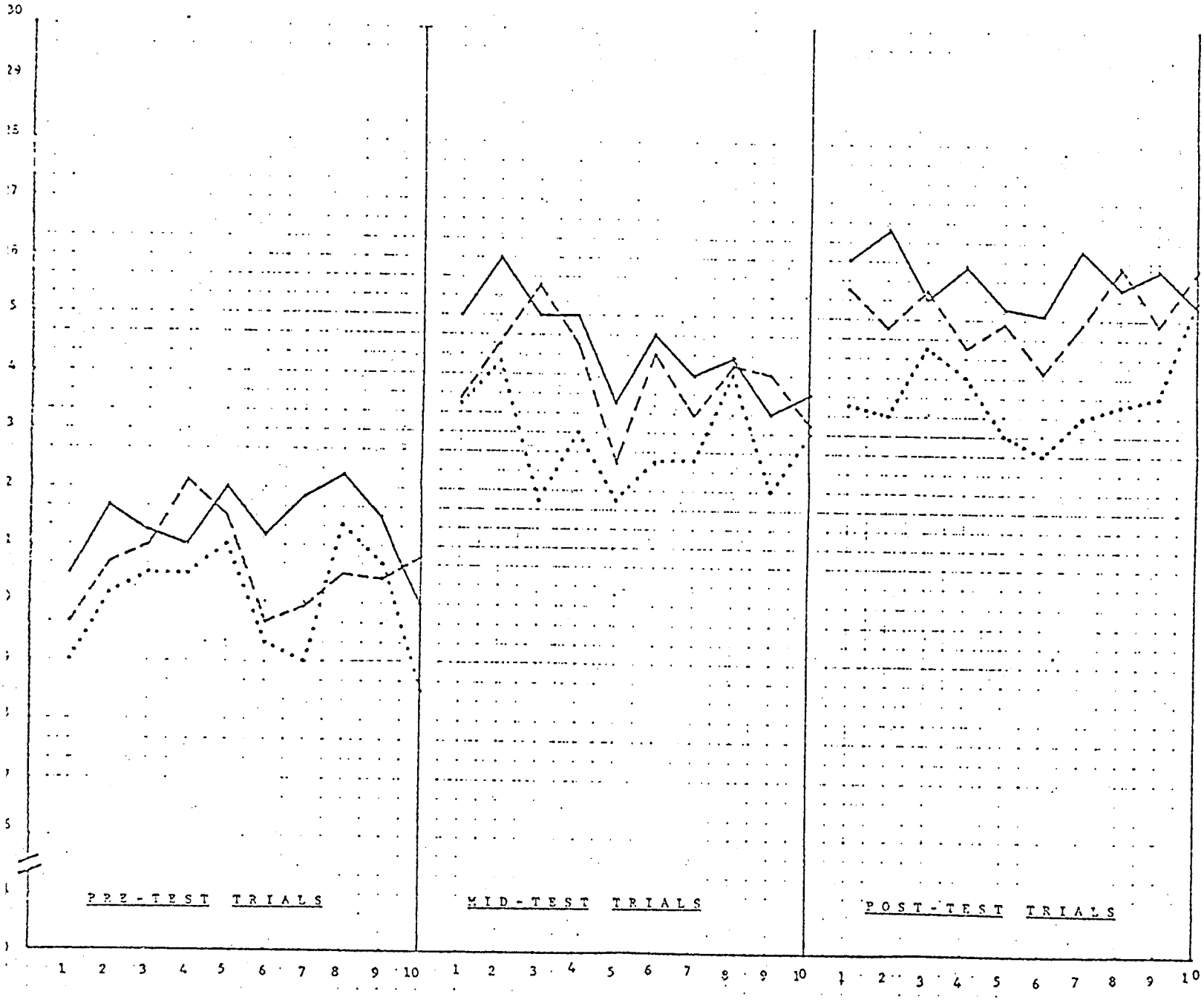

FIGURE 3.

PRE, MID AND POSTTEST MEAN PERFORMANCE SCORES BY TREATMENT GROUP.

KEY

STYLE B GROUP

STYLE C GROUP

STYLE E GROUP

variance with repeated measures on the trials factor was employed to determine the effect of these three styles, both within and between treatment groups. As can be seen in Table 2, while a significant main effect due to blocks of trials was found ($F=92.44, df=2/282, p < .01$), neither the main effect due to treatments nor the interaction effect were found to be significant in these analyses. The nonsignificant results due to treatments supported the hypothesis that these particular styles of teaching would all produce similar levels of task performance on this type of task because of the similar conditions for learning they provide. It should be noted that the treatments main effect was analyzed across all three levels of the trials factor.

In examining Figure 3, one observes that there appears to be differences between the treatments across the blocks of trials and particularly between Styles B and E across the posttest trials ($\overline{X}_B=25.77$, $\overline{X}_E=23.74$). In analyzing just the posttest trials significant differences were indeed found. A polynomial trend analysis, employing a covariate term (computed from selected pretest trials) to adjust for initial differences, revealed that while the Style B group's scores were significantly higher than the Style E group's scores, the slopes of their curves were statistically identical. This analysis did not really shed any light on the question except to suggest that although the Style E group adequately learned the task, the qualitative level of their learning was somewhat negatively affected due to factors unknown.

As will be discussed in more detail later, a poor choice of the factor to be manipulated and a lack of clarity of role may have had a negative

affect of the Style E group's performance. But, as can clearly seen in Figure 3, the Style E group started out lower and stayed lower in their performance throughout the training.

Correlated t-test performed within groups on pre to posttest difference scores yielded highly significant results over all three groups. These results confirmed that all three groups learned the task; that all three treatments were effective. This supports the major hypothesis contending that these three treatments would all be effective in facilitating the learning of this type of task.

Style B Results

Style B, the treatment which most resembled "direct" teaching (Rosenshine, 1977), proved to be an effective way of learning this task ($t=4.72, df=31, p < .01$). This finding makes sense because Style B provides clear role expectations, provides near maximum time for practice (or task engagement), and provides for systematic teacher evaluation. As can be seen in both Table 1 and Figure 3, during the three sets of test trials the Style B learners had both the highest mean score across each set and the highest mean trial within each

set. An examination of the comparable low within group variability, particularly during the posttest set of trials, suggests also that this treatment provided conditions which were generally profitable for most learners. (In examining the actual treatment trials, data not presented here, it was interesting to note clear increases in performance evident on the trial following the provision of feedback by the teacher; i.e. after every fifth trial. This observation emphasizes the importance of feedback, in the form of knowledge of results, in learning motor skills.)

Style C Results

Children under the Style C treatment also learned the task ($t=5.99$, $df=31$, $p < .01$). They not only learned the task comparable well when compared to the other groups, but they learned it under conditions which provided them with half the number of treatment performance trials. Of course, they did receive the same total number of trials as the other groups but half of these were of the mental practice type associated with the role of the observer under Style C conditions.

The value of mental practice has been documented (Corbin, 1977). While Corbin does suggest that more sophisticated research is needed, he concludes by saying that "there seems to be little doubt that mental practice can positively affect skilled motion performance." Bloom (1954), based on some of his early work, generalized that "a student's achievement is related to his participation in class whether that participation be overt or covert or both." Studying the incorrect performance of another can help improve the performance of the observer (Nixon and Locke, 1973).

Style C also proved to be an efficient way of learning; efficiency being defined here in terms of how quickly (i.e. in how few trials) a group reached a selected criterion score. This score was determined by computing

a percentage gain from the baseline. The Style C group reached this score (X=22) earlier than either of the other two groups. This finding is plausible in light of what is known about the importance of rich and frequent feedback, particularly during the early stages of motor learning (Whiting, 1975).

Social Behavior Data

Tables 3 and 4 present results comparing Style B and C groups on social behavior variables. Randomly paired dyads, within the same treatment and sex groups, were asked to "help your partner learn this task." The task, which was also a SHT task, was not the focus here. Interaction data were summarized on 14x14 matrices and comparisons were made on cell and column totals and on a number of computed "patterns" (such as the "affective pattern," which is the sum of Columns 1 and 2). Over 50 comparisons were made and most revealed significant differences between these two groups. Included here are three representative findings.

The first comparison included here (variable AA) indicates that the Style C observers (the partners providing the feedback) demonstrated significantly more "empathy" (category 1) and used significantly more "praise, encouragement and positive reinforcement" (category 2) when compared to their Style B counterparts ($F=29.93, df=1/62, p<.01$). The analysis of variable AB shows that when provided with "corrective feedback" (category 6), the Style C performers "used feedback more effectively" significantly more often than did the control group ($F=7.44, df=1/62, p<.01$). Finally, the performer "requested feedback" from his or her partner significantly more often in the Style C group ($F=45.80, df=1/62, p<.01$) than the Style B group.

These findings clearly suggest the influence of the Style C training on the development of those social skills associated with giving to and receiving feedback from a partner. Whether these findings would be

TABLE 3

Means and Standard Deviations of Social Behavior

Data for Treatment Groups B and C

	Treatment					
	Style B			Style C		
	N	MEAN	SD	N	MEAN	SD
AA	32	4.11	5.21	32	12.01	6.38
AB	32	10.32	10.20	32	16.12	8.17
AC	32	2.27	2.26	32	7.96	4.22

TABLE 4

ANOVA of Social Behavior Data

for Treatment Groups B and C

	Source of Variation	SS	DF	MS	F
AA	Treatment	1014.52	1	1014.52	29.93**
	Error	2101.83	62	33.90	
AB	Treatment	635.36	1	635.36	7.44**
	Error	5292.10	62	85.36	
AC	Treatment	525.04	1	525.04	45.80**
	Error	1235.94	62	11.47	

**$p < .01$

transferred to other situations, whether they would persist over time, or whether other social learnings could be taught similarly are questions of import and should be studied.

These findings appear to be particularly profound not only in terms of their statistical significance but for their intuitive appeal and their practical applicability. Of course, rich, one-to-one, immediate, formative feedback (i.e. feedback during performance), would seem an ideal condition for learning. Style C can provide this condition, with no apparent sacrifice to the partner's level of learning, in an equal time period, and with a decided benefit in terms of social skill development. These tutorial-like conditions seem particularly appropriate for both initial learning in a new task and for learners who are experiencing difficulties in learning.

In implementing Style C, the following suggestions appear to be worthwhile:

1. Style C should be used, particularly, (a) when social development is an objective, (b) when a rich supply of feedback is necessary (e.g. during early skill acquisition).

2. Criteria should be selected which are (a) highly relevant to success and (b) intrinsic to the task (i.e. the criteria are not observable to the performer himself, thus reinforcing the role of the observer).

3. Criteria themselves (a) should be clearly expressed and understood by all learners before reciprocation begins (a demonstration is effective), (b) should be of sufficient quantity to be helpful but should neither be overwhelming (too many) nor insufficient (too few), and (c) should include intermediate steps, clues, and/or suggestions which have been found helpful in learning the particular task, so the observer can provide feedback.

4. During the introduction of Style C, i.e. when the role relationships are being explained, the teacher should emphasize the specific things the observer and the task performer are to do, and not do, during the execution of their roles. During this introduction it is helpful for the teacher to provide explicit suggestions of how to provide feedback (e.g. to be descriptive and not judgmental, etc.) when performing the observer's role.

5. During the actual execution and reciprocation, the teacher

should be available to (a) respond to observer questions, (b) monitor the execution of both the role and content performance, and (c) provide reinforcement to the observers about their role performance.

Style E Results

While the Style E group did adequately learn the task ($t=3.11, df=31, p<.01$), it proved to be a disappointment in several other respects. Throughout the training the teachers noted incongruities in the behavior of these children. As is dictated by Spectrum theory, during the treatment trials the children were urged to work at a level of difficulty they felt was appropriate for them. It was noted that level selection was decided in what appeared to be almost random fashion. It was also noted that they appeared to lack the motivational levels exhibited by individuals in the other two groups.

In retrospect it appears that due to at least two shortcomings in the treatment design, this style did not enjoy an adequate test of it's theoretical potential. In designing the study the investigators felt they had little control over the major factors within this particular task. Specifically, distance from the target and size of the target were dictated by the apparatus. The use of modified equipment, so often appropriate for Style E episodes, was not deemed relevant to performance in this task. Manipulation of the number of practice trials or other factors relating to the performance conditions were precluded by the research design.

The factor selected for manipulation (upon which alternative levels of difficulty were fashioned) was the frequency of feedback. This proved to be a poor choice, in that the learners were apparently unable to use this factor to manipulate the task to suit their individual needs.

It appeared that Style E, in particular, caused learners conflicts

in understanding what exactly their role was. This may explain both the ambivalent attitude observed by the teachers and the initial, and continuing, depression in performance exhibited by this treatment group. Perhaps the idea of having to work at a self-selected qualitative level, as is dictated by Spectrum theory, was so contrary to the reality of experience of these children as to cause this unanticipated reaction.

Results with Exceptional Learners

It was hypothesized that the conditions associated with Style E would provide "exceptional learners" with the kind of task engagement that would facilitate significantly higher levels of performance. As can be seen in Table 5, this contention was not supported. While all six subgroups did profit from their training, between group differences were not found to be significant. Furthermore, it appears that the larger change scores exhibited by the low skilled group were more an artifact of instrument scaling than of true improvement.

Finally, it was hypothesized that children with lower self-concepts, and perhaps higher self-concepts as well, would profit particularly from the conditions for learning provided by Style E. Three measures of self-concept were employed. For each measure, in each treatment group, two subgroups of high and low self-concept Ss were formed (see Table 6). As can be seen in Table 7, intercorrelations among these three measures and a fourth measure, the prediction score, were low. With this in mind, analyses of these self-concept were performed (see Table 8). None of these comparisons proved to be significant and none were analyzed further due to these low intercorrelations. Self-concept continues to be an interesting, but an elusive, trait.

TABLE 5

CANOVA of Posttest SHT Scores for Low and High Skilled Ss for Treatment Groups B, C and E

	Source of Variation	SS	DF	MS	F
Low Skilled	Covariate	27.13	1	27.13	4.37*
	Treatment	2.77	2	1.39	.22
	Error	136.70	22	6.21	
High Skilled	Covariate	.12	1	.12	.02
	Treatment	6.87	2	3.43	.56
	Error	177.81	29	6.13	

*$p < .05$

TABLE 6

Means and Standard Deviations of Performance Improvement Scores (SHT) for Low and High Self-Concept Ss in Treatment Groups B and E

	Treatment			
	Style B		Style E	
	MEAN	SD	MEAN	SD
[1]Low Self-Concept	5.44	4.22	2.59	4.90
High Self-Concept	2.23	3.33	4.08	2.66
[2]Low Self-Concept	3.05	2.96	2.40	3.52
High Self-Concept	6.04	7.67	3.92	2.57
[3]Low Self-Concept	4.16	4.62	4.56	5.26
High Self-Concept	2.26	3.05	3.58	3.46

1= as determined by the Piers-Harris
2= as determined by the Florida Key
3= as determined by the Discrepancy Score

TABLE 7

Intercorrelations Among the Three Measures of Self-Concept and the Predicted Score for Treatment Groups B and E

Variable	1	2	3
1. Discrepancy Score	--		
2. Piers-Harris	-.19	--	
3. Florida Key	-.13	.28	--
4. Predicted Score	-.38	.34	.12

TABLE 8

ANOVA of Performance Improvement Scores (SHT) for Low and High Self-Concept Ss in Treatment Groups B and E

	Source of Variation	SS	DF	MS	F
[1]Low Self-Concept	Treatment	6.67	1	6.67	.49
	Error	177.71	13	13.67	
[1]High Self-Concept	Treatment	.69	1	.69	.04
	Error	324.47	19	17.08	
[2]Low Self-Concept	Treatment	2.08	1	2.08	.20
	Error	162.24	16	10.14	
[2]High Self-Concept	Treatment	23.80	1	23.80	1.02
	Error	510.67	22	23.21	
[3]Low Self-Concept	Treatment	.60	1	.60	.02
	Error	342.72	14	24.47	
[3]High Self-Concept	Treatment	8.66	1	8.66	.79
	Error	209.38	19	11.01	

1= as determined by the Piers-Harris
2= as determined by the Florida Key
3= as determined by the Discrepancy Score

Summary and Conclusion.

This study examined the effects of three of Mosston's Styles of Teaching on motor skill acquisition and social skill enhancement of fifth grade children. It was found that all three styles proved effective in promoting learning of this kind of motor task. It was also found that the children in the Style C group significantly improved their ability to give to and receive feedback from a peer. The Style E group was not found to more significantly facilitate learning for "exceptional" children as was hypothesized.

In conclusion, all three styles of teaching would appear to be appropriate for instructional use with the kind of task employed in this study. Confirming Spectrum theory, Style C was found to significantly enhance social skill development and if this is an objective, Style C would appear to be most appropriate for instructional use. Finally, it is suggested that this study be repeated, using a different factor for level development in the Style E group, to more appropriately test the "exceptional" learner hypotheses.

References

Bloom, B.S. "Thought Processes of Students in Discussion Classes," in Accent on Teaching. (S.J. French, Ed.) N.Y.: Harper and Brothers, 1954, 30.

Bloom, F.S. Human Characteristics and School Learning. N.Y.: McGraw-Hill, 1976, 92-93.

Boschee, F.A. A Comparison of the Effects of Command, Task and Individual Program Styles of Teaching on Four Developmental Channels. (Unpublished dissertation, University of Montana, 1972).

Brophy, J.E. and C.M. Evertson. Process-Product Correlations in the Texas Teacher Effectiveness Study: Fianl Report (1974). Research Report 74-4, Austin, Texas, 1974.

Brophy, J.E. "Advances in Teacher Effectiveness Research". (Occasional Paper, Published by the Institute for Research on Teaching, Michigan State University, 1979), 14.

Bryant, W. Comparison of the Practice and Reciprocal Styles of Teaching. (Unpublished project, Temple University, 1974).

Campbell, E.T. and J.C. Stanley. Experimental and Quasi-experimental Designs for Research. Chicago: Rand McNally, 1963, 13-25.

Chamberlain, J.R. The Effects of Mosston"s "Practice Style" and "Individual Program-Teacher Design" on Motor Skill Acquisition and Self-Concept of Fifth Grade Learners. (Unpublished dissertation, Temple University, 1979).

Corbin, C.B. "Mental Practice," in Ergogenic Aids and Muscular Performance. (W.P. Morgan, Ed.) N.Y.: Academic Press, 1972, 93-118.

Cronbach, L.J. Educational Psychology. N.Y.: Harcourt Brace Janvanovich, 1977, 424-425.

Deci, E.L. and J. Porac. "Cognitive Evaulation Theory and the Study of Human Motivation," in The Hidden Costs of Reward. (M.R. Lepper and D. Greene, Eds.) Hillsdale, N.J.: Lawrence Erlbaum Associates, 1978, 151.

Dougherty, N.J. A Comparison of the Effects of Command, Task and Individualized Program Styles of Teaching in the Development of Physical Fitness and Motor Skills. (Unpublished dissertation, Temple University, 1970.

Doyle, W. "Paradigms for Research on Teacher Effectiveness," in Review of Research in Education, Vol. V. (L.S. SHylman, Ed.) Itasca, Illinois: Peacock Publishers, 1978, 165, 164.

Ebel, R.L. "Some Limitations of Basic Research in Education," Phi Delta Kappan, October 1967, 81-84.

Ferguson, G.A. Statistical Analysis in Psychology and Education. N.Y.: McGraw-Hill, 1966, 246-264.

Fitzgibbon, C.T. and L.L. Morris. How To Design a Program Evaluation. Beverly Hills, Calf.: Sage Publications, 1978, 29-30.

Gage, N.L. The Scientific Basis of the Art of Teaching. N.Y.: Teachers College Press, 1978, 14.

Gagne, R.M. The Conditions of Learning. N.Y.: Holt, Rinehart and Winston, 1970, 22.

Gerney, P.E. The Effect of Mosston's "Practice Style" and "Reciprocal Style" on Psychomotor Skill Acquisition and Social Development of Fifth Grade Students. (Unpublished dissertation, Temple University, 1979).

Goldberger, M.S. and Billy E. Gover. "Research on Teaching Physical Education," in Encyclopedia of Health, Phsyical Education and Recreation, Vol. I. (J.S. Bosco, Ed.) Reading, Mass.: Addison-Wesley Publishing, 1979.

Goldberger, M.S. "Studying Your Teaching Behavior," Journal for Health, Physical Education and Recreation, October 1974, 33-36.

Goldberger, M.S. "A Taxonomy of Psychomotor Forms: (Occasional Paper, Published by the Institute for Research on Teaching, Michigan State University, 1980).

Jacoby, D.J. A Comparison of the Effects of Command, Reciprocal and Individual Styles of Teaching on the Development of Selected Sport Skills. (Unpublished dissertation, Ohio University, 1975).

Locke, L.F. "Research on Teaching Physical Education: New Hope for a Dismal Science," Quest, Monograph 28, Summer 1977, 2-16.

Mariani, T. "A Comparison of the Effectiveness of the Command Method and the Task Method of Teaching the Forehand and Backhand Tennis Strokes," Research Quarterly, May 1970, 171.

McCleary, E. A Comparison of the Task and Problem-Solving Styles in Teaching Kindergarter and First Grade Students a Unit on Self-Testing Activities. (Unpublished project, Temple University, 1976).

McDonald, F.J. "The Effects of Teaching Performance on Pupil Learning," Journal of Teacher Education, Winter 1976, 319.

Mosston, M. Developmental Movement. Columbus, Ohio: C.E. Merrill Books, 1965.

Mosston, M. Teaching: From Command To Discovery. Belmont, Balf.: Wadsworth Publishing, 1972, 25.

Nixon, J.E. and L.F. Locke, "Research on Teaching Physical Education," in Second Handbook of Research on Teaching. (R.M.W. Travers, Ed.) Chicago: Rank McNally, 1973, 1227, 1224, 1217.

Oxendine, J.B. Psychology of Motor Learning. N.Y.: Appleton, Century, Crofts, 1968, 203, 61.

Pichert, J.W., R.C. Anderson, B.V. Armbruster, J.R. Surber and L.L. Shirey. Final Report: An Evaluation of the Spectrum of Teaching Styles. Laboratory for Cognitive Studies in Education, Urbana: University of Illinois, May 1976, 22-23.

Piers, E.V. Manual for the Piers-Harris Children's Self-Concept Scale. Nashville, Tenn.: Counselor Recordings and Tests, 1969.

Purkey, W.W., B.R. Cage and W. Graves. "The Floria Key," Educational and Psychological Measurement, 1973, 979-984.

Rosenshine, B. "Review of Teaching Variables and Student Achievement," in The Appraisal of Teaching: Concepts and Process. (G. Borich, Ed.) Reading, Mass.: Addison-Wesley Publishing, 1978, 114-120.

Shavelson, R. and N.Dempsey. "Generalizability of Measures of Teaching Behavior," in Review of Educational Research, Vol. IV., 1976, 553-611.

Skinner, R. The Decision Process During the Acquisition of a Complex Motor Skill. (Unpublished dissertation, Columbia University, 1974).

Soar, R.S. Multivariate Statistical Procedures in Predicting Teacher-Pupil Classroom Behavior. Cooperative Research Project No. 1170, Columbia, South Carolina, 1962, 15.

Soar, R.S. Follow Through Classroom Process Measurement and Pupil Growth (1970-71) Final Report. Gainesville, Fla.: Institute for the Development of Human Resources, University of Florida, 1973.

Stallings, J.A. and D.H. Kaskowitz. Follow Through Classroom Observation Evaluation (1972-73). Menlo Park, Calf.: Stanford Research Institute, 1974.

Virgilio, S.J. The Effects of Direct and Reciprocal Teaching Strategies on the Cognitive, Affective, and Psychomotor Behavior of Fifth Grade Pupils in Beginning Archery. (Unpublished dissertation, Florida State University, 1979).

Whiting, H.T.A. Concepts in Skill Learning. London: Lepus Books, 1975.

Wing, S.W. A Study of Children Whose Reported Self-Concepts Differ From Classmates Evaluation of Them. (Unpublished dissertation, University of Oregon, 1966).