The relationship between teacher verbal feedback, aptitude, and academic intrinsic motivation

Ann Jenkins Wickwire

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The relationship between teacher verbal feedback, aptitude, and academic intrinsic motivation

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by
Ann Jenkins Wickwire
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THE RELATIONSHIP BETWEEN TEACHER VERBAL FEEDBACK, APTITUDE, AND ACADEMIC INTRINSIC MOTIVATION

by

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THE RELATIONSHIP BETWEEN TEACHER VERBAL FEEDBACK, APTITUDE, AND ACADEMIC INTRINSIC MOTIVATION

The purpose of the study was to investigate the relationship between academic intrinsic motivation and positive teacher verbal feedback, negative teacher verbal feedback, and student aptitude for academic work. The research questions evolved from the Cognitive Evaluation Theory of Edward Deci (Deci & Ryan, 1985) in which intrinsic motivation develops out of a sense of competence and self-determination. In that teacher verbal feedback to students provide messages about academic competence, it was hypothesized that positive verbal feedback would enhance intrinsic motivation and negative verbal feedback would be detrimental to intrinsic motivation.

The subjects for the study were 368 fourth and fifth grade students. Student academic intrinsic motivation was measured by a questionnaire developed by Harter (1981). Aptitude was assessed with the Cognitive Abilities Test (Thorndike & Hagen, 1985). Negative and positive teacher verbal feedback reactions were determined by classroom observers who coded all teacher verbal feedback reactions to the students in accordance with the observation system developed by
Brophy and Good (1969). Through factor analysis the positive feedback factor and the negative feedback factor were formed from the verbal feedback categories loading with those factors.

Results revealed that both aptitude and positive verbal feedback correlate positively with academic intrinsic motivation. Aptitude for school work, positive verbal feedback, and grade level contributed about 8% of the total variance of intrinsic motivation. Negative verbal feedback did not contribute to the prediction of the level of intrinsic motivation. Due to the low level of variance attributed to these factors, conclusions which could be drawn are limited. However, it was suggested that in addition to studying factors influencing the sense of competency, classroom factors which would contribute to a sense of autonomy need to be included in future studies.

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THE RELATIONSHIP BETWEEN TEACHER VERBAL FEEDBACK,
APTITUDE, AND ACADEMIC INTRINSIC MOTIVATION
CHAPTER 1
Introduction

Justification for Study

Intrinsic motivation has been conceptualized as an enduring trait or orientation of an individual (Deci & Ryan, 1985, Deci, 1975 and Harter, in press), however, it has been shown experimentally to be affected by environmental situations. Under certain circumstances, intrinsic motivation has been reduced by monetary rewards (Deci, 1971), awards (Lepper, Greene, & Nisbett, 1973), tokens (Greene, Sternberg, & Lepper, 1976) and surveillance (Lepper & Greene, 1975). Intrinsic motivation has been enhanced experimentally by the provision of a choice of activity (Danner & Lonky, 1981) and positive feedback (Blanck, Reis, and Jackson, 1984). Experimental results such as these led Deci and Ryan (1985) to conclude that intrinsic motivation is dependent upon feelings of competence and self-determination. Feelings of competence and self-determination occur when individuals are allowed choices and perceive an internal locus of causality and are supplied positive and accurate feedback that
indicates an effective, successful interaction with the environment.

Within the school environment, classroom activities and management strategies of the teacher can increase or decrease intrinsic motivation. Classrooms where the teachers foster autonomous behaviors on the part of the students have higher levels of student academic intrinsic motivation than classrooms where the teachers are more controlling of their students' behaviors (Deci, Nezlek, & Sheinman, 1981, Deci, Schwartz, Sheinman, & Ryan, 1981, and Green & Foster, 1986). In these studies, the teachers were rated as autonomous or controlling based on their self ratings and not on actual observed behaviors. The effect of actual observed teacher behavior on intrinsic motivation apparently has not been researched.

Although verbal feedback has received considerable attention experimentally, the effect of various types of verbal feedback in the classroom on academic intrinsic motivation over time has not been addressed. Boggiano and Barrett (1985) provided negative and positive feedback in a controlled experiment and found that negative and positive feedback differentially affected the performance of intrinsically motivated students versus extrinsically motivated students. Failure feedback impaired
performance of extrinsically motivated students but not the intrinsically motivated students. Success feedback had a beneficial impact on the performance of intrinsically motivated students but not on the performance of the extrinsically motivated students.

Both Anderson, Manoogian and Reznick (1976) in a study with preschool children and Harackiewicz (1979) in a study with high school students found that positive feedback about performance enhanced intrinsic motivation.

Ability has received little attention in the vast body of research on intrinsic motivation. Silon and Harter (1986) found a significant difference between the academic intrinsic motivation of educable mentally retarded students and regular education students with the mentally retarded students displaying lower levels of academic intrinsic motivation. Harter (in press) subsequently noted that the relationship of ability to academic intrinsic motivation needed further exploration. Gottfried (1990) reported that intelligence in young children was predictive of the level of intrinsic motivation at later ages.

Of interest in the present study are positive teacher feedback, negative teacher feedback, student aptitude, and academic intrinsic motivation in the classroom setting.
Statement of the Problem

The problem to be investigated in this study is the relationship between student academic intrinsic motivation, student aptitude, positive teacher feedback, and negative teacher feedback.

Theoretical Rationale

The theoretical rationale for this study is based on the Cognitive Evaluation Theory of Edward Deci (Deci, 1975 and Deci & Ryan, 1985). Accordingly, intrinsic motivation is viewed from a cognitive theoretical perspective, developing as a result of an individual's interpretation of events and experiences.

Intrinsic motivation develops in response to certain needs. DeCharms (1968) spoke of the need for a sense of personal causation. Individuals who see themselves as originators of their own behaviors would be said to be intrinsically motivated while those that sense their behaviors to be in response to external forces would be considered as extrinsically motivated. Building upon this idea of personal causation, Deci (1975) proposed the Cognitive Evaluation Theory which states that intrinsically motivated behaviors develops out of a need for a personal sense of competence and self-determination. Behavior is goal directed. The feelings of competence and self-determination
experienced by the individual are the rewards for the behaviors.

Intrinsic motivation is innate according to White (1959). White stated that exploration and mastery attempts of a child were explained by the innate intrinsic need to feel competent. He further stated that this innate intrinsic motivation had evolutionary adaptive value as the human's drive to develop competence was necessary for survival. In addition to agreeing with White's contention, Deci used Piaget's research as further basis for stating that intrinsic motivation is innate. Piaget (1952) believed that a child's explorative behaviors are innate. According to Piaget children practice their developing skills in order to achieve competence and the reward for the activity is the feeling of satisfaction. Such behaviors that are performed for the feeling of satisfaction are defined by Deci as intrinsically motivated behaviors.

According to Deci, intrinsic motivation is affected by interaction with the environment. If events are informational to an individual and enhance the perceived self-determination and perceived competence, they also enhance intrinsic motivation. If the events are controlling in pressuring individuals toward certain outcomes, the events have a negative
affect on intrinsic motivation. Amotivating or negative events relay messages to individuals that they do not have control over outcomes and are not competent and therefore, undermine intrinsic motivation.

Intrinsic motivation exists to differing degrees in all individuals. According to the Cognitive Evaluation Theory, that which is extrinsic may become intrinsic through the process of internalization (Ryan, Connell, & Deci, 1985). External controls become integrated into the self. At the lowest end of the continuum is external regulation where one does things in order to receive tangible rewards. At the highest level, a system of values and goals have developed so that an individual wants to learn for the satisfaction received. Ideally this movement from extrinsic to intrinsic would be taking place within the school setting.

**Definition of Terms**

Intrinsic motivation, as defined by Deci (1975), results from feelings of competence and self-determination. Tasks are performed for their own sake and not for external rewards. Extrinsically motivated behaviors are those that are performed because of expected rewards or consequences.

Verbal feedback refers to the teacher's verbal
reaction to a student's response. Positive feedback occurs when the teacher praises and/or acknowledges a correct answer. Negative feedback occurs when the teacher indicates that an answer is erroneous.

Student aptitude is the level of development of general cognitive skills necessary for success in school.

**Research Hypotheses**

1. There is a significant positive correlation between student academic intrinsic motivation and the amount of positive verbal feedback provided by the teacher to the student.

2. There is a significant negative correlation between student academic intrinsic motivation and the amount of negative verbal feedback provided by the teacher to the student.

3. There is a significant positive correlation between student academic intrinsic motivation and the student's aptitude for school work.

4. Positive feedback, negative feedback, and aptitude for school work contribute significantly to the total variance of academic intrinsic motivation.
Sample Description and General Data Gathering Procedures

The sample for the study was drawn from the entire fourth and fifth grade population in a rural school division. Special education students and those students currently repeating the current grade were not included. The sample size of students with complete sets of data was 368 students from 30 classrooms.

Students were administered the Cognitive Abilities Test (CogAT) (Thorndike & Hagen, 1985) in mid October. A composite score was determined and used in the study for the measure of aptitude.

In January the students completed A Scale of Intrinsic Versus Extrinsic Orientation in the Classroom (Harter, 1981). A single score was calculated and used as the measure of academic intrinsic motivation.

During the third six weeks period of school, all teachers in the 30 fourth and fifth grade classrooms were observed on three separate occasions for periods of 30 minutes each. The observations took place during language arts instruction. Observers coded the teachers' verbal feedback reactions according to the Teacher-Child Dyadic Interaction System (Brophy & Good, 1969).
Limitations

There are limitations to the study. No attempt was made to use a random sample, rather all the fourth and fifth grade students falling within the already described parameters were used. The sample was also from a rural area where many of the children are from low socioeconomic homes where parents have limited educations thus making generalization to the entire population difficult.

A second limitation existed due to the instrument used to measure academic intrinsic motivation. While adequate reliability and validity were established with the norming sample, extensive reliability and validity studies have yet to be conducted.

This study was based on correlational methods, giving directional information for future, more controlled studies.
Development and Status of Theory

Deci’s Cognitive Evaluation Theory (1975) grew out of research in which intrinsic motivation was demonstrated to decrease when monetary rewards were given for performance on specific tasks. This is referred to as the overjustification effect.

Although Deci believes that intrinsic motivation is innate, an individual’s behaviors constantly reflect interactions with the environment. Deci and Ryan (1985) state four propositions to explain the affect of the environment on intrinsic motivation. In the first they state that:

External events relevant to the initiation or regulation of behavior will affect a person’s intrinsic motivation to the extent that they influence the perceived locus of causality for that behavior. Events that promote a more external perceived locus of causality will undermine intrinsic motivation, whereas those that promote a more internal perceived locus of
causality will enhance intrinsic motivation. (p. 62).

Locus of causality represents the degree of self-determination. Events that lead to an external locus of causality are in opposition to self-determination and are described as controlling as opposed to events that support autonomy and therefore lead to an internal locus of causality.

The second proposition of the Cognitive Evaluation Theory states that:

External events will affect a person’s intrinsic motivation for an optimally challenging activity to the extent that they influence the person’s perceived competence, within the context of some self-determination. Events that promote greater perceived competence will enhance intrinsic motivation, whereas those that diminish perceived competence will decrease intrinsic motivation (p. 63).

Intrinsic motivation is enhanced when an individual receives positive, effectance-relevant feedback and when a task is optimally challenging.

The third proposition of the Cognitive Evaluation Theory states that:

Events relevant to the initiation and regulation of behavior have three potential aspects, each
with a functional significance. The informational aspect enhances intrinsic motivation. The controlling aspect undermines motivation. The amotivating aspect undermines intrinsic motivation and promotes amotivation. The relative salience of these three aspects to a person determines the functional significance of the event. (p. 64)

Choice and positive feedback tend to be informational, deadlines and surveillance tend to be controlling and negative feedback tends to be amotivating.

The fourth proposition was introduced to account for intrapersonal events:

Intrapersonal events differ in their qualitative aspects and, like external events, can have varied functional significances. Internally informational events facilitate self-determined functioning and maintain or enhance intrinsic motivation. Internally controlling events are experienced as pressure toward specific outcomes and undermine intrinsic motivation. Internally amotivating events make salient one’s incompetence and also undermine intrinsic motivation. (p. 107)

In Deci's (1971) first investigation of the effects of extrinsic rewards on intrinsic motivation a design was developed which has become the typical design in the experimental study of intrinsic
motivation. In that study college students were engaged in working on the Soma, a commercially produced puzzle. It was chosen because it was believed that it should hold intrinsic motivational interest for college students. During the first session, both control and experimental groups were told that they would use the puzzle pieces to form various designs. They worked with no indication of rewards for completing the designs. At the beginning of the second session, the experimental group was told that they would be paid money for each figure completed. At the beginning of the third session, the experimental group was told that since there had been money only for one session they would not receive money that day. Intrinsic motivation was measured by the amount of time spent on the puzzles during free choice time. Subjects were asked to rate the degree to which they found the task enjoyable.

All groups rated the task as enjoyable, indicating to the researcher that the task had intrinsic motivation value. The experimental group’s time, however, decreased significantly after rewards were removed. Deci interpreted this to indicate that an intrinsically motivated task became less so because of the extrinsic reward.

A criticism of this study as well as of the other studies following the general design is that
the task was selected because it appeared to be interesting and therefore intrinsically motivating. This assumption would not be true in all cases and the short questionnaire completed by the subjects has not been validated as a measure of intrinsic motivation. Additionally, the definition of intrinsic motivation has been operationalized to mean the amount of time spent on a task. The more time on task without reward or expectation of reward, the more intrinsically motivated the behavior was interpreted to be. Validation of this operational definition of intrinsic motivation has been through correlations of time on task with expressed interest by the participant following the experiment. Despite the various studies reporting the results of the interest questionnaire to support the time on task as a measure of intrinsic motivation, too little data has been provided in the literature as to the correlational data.

A second concern is related to the specificity of the task for which intrinsic motivation is being measured and the ability to generalize the results to other settings. Research studies conducted in academic environments frequently have used what appeared to be high interest tasks rather than the required routine academic tasks, making it difficult to generalize the results. For the intrinsically motivating task for
elementary aged children Boggiano and Ruble (1979) used a looking for hidden pictures task, Pittman, Emery, and Boggiano (1982) used a toy game, and Reiss and Sunskinsky (1975) used listening to songs. The present study will overcome this criticism by being conducted in the natural setting of the classroom where intrinsic motivation will be measured relative to actual academic tasks.

With these reservations in mind, Rummel and Feinberg (1988) conducted a meta-analysis of research results from intrinsic motivation studies to determine if the research supported the contention that extrinsic rewards decreased intrinsic motivation. Studies to be analyzed were chosen if the extrinsic reward had been operationalized to convey controlling information to the subject. Forty-five studies conducted between 1971 and 1988 were included in the analysis. Only five studies had negative effect sizes contradicting the overjustification effect. Effect sizes from these studies ranged from -.618 to 1.578 with weighted mean effect size of .329. This was significant at the .05 level leading the researchers to conclude that extrinsic rewards have a detrimental effect on intrinsic motivation. A test of homogeneity was performed with the results ($H = 99.783$) indicating that the effect sizes were all estimates of the same parameter.
The undermining of intrinsic motivation is related to the issue of control and competence (Deci and Ryan, 1987). Factors which increase an individual's perception of competence and control or autonomy contribute to the intrinsic motivation of that individual. Deci and Ryan (1987) reviewed research which indicated that rewards, threats, deadlines, evaluation, and surveillance undermine intrinsic motivation. According to the authors' interpretations, these events were experienced as controlling and thus reduced an individual's sense of self-determination while choice and positive feedback provided a sense of control and competence enhancing the individual's self-determination. Such events would be more intrinsically motivating.

An example of one such study conducted with preschool children provides support for Deci's notion that even at this young age, controlling events undermine self-determination and thus intrinsic motivation (Lepper and Greene, 1975). One group of preschool children were given attractive puzzles to complete with a promise of the extrinsic reward of being able to play with a group of toys after they had completed the puzzles. A second group was not offered the reward. One group was assigned to surveillance conditions and was told that they would be watched.
Two weeks after the experimental sessions, the children were observed in the classroom and rated on the amount of time spent on the same puzzles. Those children who had been given a reward in the experimental condition showed less interest in the puzzles than did their counterparts. Those children that had been under surveillance were less interested in the puzzles. The control group continued to be interested in the puzzles indicating that the reduction in interest on the part of the experimental groups was due to more than just familiarity or boredom with the puzzles. In terms of the Cognitive Evaluation Theory, the element of control introduced through the use of extrinsic rewards and through the use of surveillance undermined intrinsic motivation for a task that was judged to be of intrinsic motivational value.

The Lepper and Greene (1975) study, as well as other studies providing support for the Cognitive Evaluation Theory, have been criticized by behaviorists (Feingold and Mahoney, 1975 and Flora, 1990). The contention is that the design is a one-trial reinforcement procedure and not a multiple schedule that would parallel normal classroom token economies. To demonstrate this, Feingold and Mahoney (1975) randomly selected five second grade children and collected baseline data over five weeks. During the
first two week period the children were given a connect the dot task for which they were given no rewards. This was followed by one week of reinforcement (points) for the performance. After two weeks, the children were again asked to perform the task over a two week period with no reinforcement for performance. The results indicated an average increase in performance from the first baseline to the third. Performance did not appear to be inhibited by the introduction of rewards.

To counter such criticisms of the basic research design used to substantiate the decrease in intrinsic motivation with the introduction of rewards, Greene, Sternberg, and Lepper (1976) designed a multiple-trial, token economy paradigm. Fourth and fifth grade students were chosen for the experiment based on the amount of time they each spent in a math lab over a 13 day period working on four different math activities that had been introduced by the researchers. This information was used to group the children according to level of interest for the different math activities. The groups were then randomly assigned to one of four treatment conditions. The three experimental groups were either differentially reinforced for time spent on either of the two most preferred math activities, for time spent on either of the two least preferred math
activities, or for time spent on either of two activities selected on the basis of preference. The fourth group (control group) was nondifferentially reinforced for time spent on any of the activities. Students were reinforced with credits to be applied to an award at an Awards Assembly. After 12 days of reinforcement, the withdrawal phase was begun with the announcement that no further credits toward awards would be given because it was unfair to the other students. They were encouraged to continue with the activities during lab time. All three differentially reinforced groups spent significantly less time on the activities after the reinforcements had been withdrawn than they had during the baseline. This study is important in showing that the results found in one-trial reinforcement studies are consistent with results of research conducted in a multiple-trial, token economy paradigm.

Descriptive Variables

The present study measured the relationship between student academic intrinsic motivation, student aptitude, and teachers’ positive and negative verbal feedback reactions to students. Relevant research is presented for each of these variables.
**Academic Intrinsic Motivation**

By definition, intrinsic motivation is the desire to perform or achieve for the pleasure derived from the activity. Young children display intrinsic motivation through their active exploration of their environment. Curiosity leads children to continue such activities for no apparent tangible rewards (Piaget, 1952). Most children are intrinsically motivated to learn, however, with the first encounter with school, children find that they are required to do many things that are not intrinsically motivating. Areas that potentially could undermine intrinsic motivation for students because of the issue of external control would include the use of grades or tokens, the need for limit setting, teacher orientations, classroom structure, and teacher feedback (Deci and Ryan, 1985).

Several studies have indicated that the quality of learning differs between intrinsic and extrinsic learning conditions. Grolnick and Ryan (1985) studied the affect of grades on intrinsic motivation and subsequent achievement. Fifth grade children were assigned to one of three groups and were given a social studies passage to read. One group was told that a test would be given on the material (extrinsic group). The members of the second group were told to read the selection to see what they could get from it (intrinsic
group). The third group was given no other instruction other than to just read the selection. The children were then given a short test to measure their learning of facts from the passage and to assess their conceptual learning from the selection. Both the group given the intrinsic set of instructions and the group given the extrinsic set of instructions scored higher on rote recall of facts than did the group that was just told to read the selection. The understanding of the meaning of the selection was significantly higher for the group that had received the intrinsic instruction.

Benware and Deci (1984) found similar results in a study with college students. Forty-three college volunteer subjects were given a learning task. The members in one group were instructed to read and study the material just as they would for one of their classes in preparation for a test on the material. The other group was instructed to read the material and prepare to be able to teach it to another student. The students who learned in order to teach expressed significantly (p < .02) more interest in the subject than did those that were learning the material for a test. On a test following the study time, there was no difference in the level of rote learning between the two groups, however, the group that had studied with
the intention to teach the material scored significantly \( p < .001 \) higher on conceptual learning of the material.

In order to study intrinsic motivation in the academic realm, Gottfried (1985, 1990) developed the \textbf{Children's Academic Intrinsic Motivation Inventory (CAIMI)} for grades four through nine and the \textbf{Young Children's Academic Intrinsic Motivation Inventory (Y-CAIMI)} for children in grades one through three. Gottfried's definition of intrinsic motivation is consistent with Deci's (1985) definition more specifically applied to the academic setting. Citing Brophy's (1983) proposal that student motivation to learn is both general and situationally specific, Gottfried developed the inventory to measure academic intrinsic motivation for specific subject areas and to measure the general orientation toward intrinsic motivation. The \textbf{CAIMI} was developed and validated through three studies (Gottfried, 1985). In the first study, a pool of 60 items were constructed based on the research in intrinsic motivation as enjoyment of academic learning characterized by the orientation toward curiosity, persistence, mastery, and preference for challenging, novel tasks. The first study used 141 children from grades 4 through 7. As a result of internal consistency analysis, 38 items remained. In
the second study (N=260 grades 4 through 7), 84 additional items were included with item to total correlations ranging from .30 to .82.

Test-retest reliability was demonstrated in the two studies. In the first study coefficients ranged from .66 to .76 after two months of time. Similar coefficients were found in the second study. Internal consistency reliability coefficients in the study ranged from .80 to .91. The third study was conducted with 166 students grades 5 through 8. Internal consistency coefficients were similar to those found in the first and second studies.

Gottfried (1985) correlated the achievement scores from group standardized tests and teacher grades to the students' scores on the CAIMI and found that at all grade levels academic intrinsic motivation correlated positively and significantly with both measures of student achievement. She concluded that intrinsic motivation accounted for up to approximately 20 per cent of variance in school achievement.

With the development of the Young Children's Academic Intrinsic Motivation Inventory as a downward extension of the CAIMI, Gottfried (1990) conducted a longitudinal study with 107 children. The children were followed in a developmental study from age one. At ages 7, 8, and 9 the children completed the Y-CAIMI
and the CAIMI along with measures of intelligence, achievement, anxiety and perception of competence. Across the span of three years, academic achievement motivation was consistent with the stability becoming more pronounced from age 8 to age 9. Cross-age correlations showed that for children age 7 and 8, intelligence correlated significantly and positively with intrinsic motivation. Children who at age 7 and 8 measured higher on intelligence measures, showed greater intrinsic motivation at age 9 than did those of lower intelligence performances. Similar results were found with correlations between achievement scores on an individually administered achievement test and intrinsic motivation. Children with higher achievement at ages 7 and 8, showed significantly higher intrinsic motivation at age 9.

The conclusion could be made that children who are more intelligent will achieve at a higher rate and the intrinsic motivation will be at a level commensurate with intelligence and achievement. Gottfried's (1985) research revealed that intrinsic motivation does not remain constant throughout the school years, but rather there is a general decrease in general intrinsic motivation with age. Similar findings were reported by Harter (1981). A Scale of Intrinsic Versus Extrinsic Orientation in the Classroom was developed to measure
academic intrinsic motivation for children grades three through nine. In all samples used in the development of the scale, there was a significant shift from an intrinsic orientation on the motivation subscales to a more extrinsic orientation with increasing grade level. One interpretation suggested by Harter (1981) was that with increasing time in school, children adapt to the demands of the school culture and in the process, children’s desire for challenge, their curiosity, and their desire for independent mastery are stifled. Gottfried (1985) also concluded that the environment was an important variable in the maintenance of intrinsic motivation and called for research investigating the effect of various environmental factors on intrinsic motivation. One apparent important variable in the child’s academic environment is the teacher and the verbal feedback from that teacher. The present study addressed this issue.

Positive and Negative Verbal Feedback

A review of research indicates that teachers provide differential feedback to students. Brophy and Good (1970) conducted an experiment in which first grade teacher expectations of students were compared to the quantity and quality of teacher-student interactions. Teachers were asked to rank their
students according to their achievement. Classroom observations were then made of the students who had received either high rankings or low rankings. Teacher-student interactions were coded during the observation period. The results indicated a non-significant trend toward more teacher initiated contacts with the low achieving children, however, the only significant finding was that boys were higher than girls on all measures of teacher-initiated contacts. A further examination of the types of teacher feedback revealed significant student sex and achievement level differences. High achieving students were more frequently praised for correct answers, less frequently criticized for incorrect answers, and more frequently provided opportunities for second responses. The failure to provide any feedback to students was 3.33 % for the high achieving students and 14.75 % for the low achieving students. Boys were praised more frequently than girls for correct answers.

Irvine (1986) conducted a study in which the focus was primarily on teacher verbal feedback. In an extensive study of 63 classrooms grades kindergarten through fifth grade, observers coded teacher-student interactions. Data analysis was conducted relative to sex, student race, and grade level. As in the Brophy and Good (1970) study, significant differences were
found in the amount of feedback that girls received. Upper elementary girls received significantly less academic feedback than did boys. This was true for both black and white girls. These studies are important in revealing that verbal interactions between teachers and students do differ. The observational methods employed in both studies allow for an examination of not only the total of interactions but an examination of the quality of interactions between teacher and students. If intrinsic motivation is in part determined by a student’s perception of competence as theorized in the Cognitive Evaluation Theory, the teacher’s response to a student would be crucial.

According to Cognitive Evaluation Theory, intrinsic motivation would be enhanced by positive feedback and undermined by negative feedback. Boggiano and Barrett (1985) proposed that failure feedback would lower the level of intrinsic motivation. The Scale of Intrinsic versus Extrinsic Orientation in the Classroom (Harter, 1981) was administered to 53 children from grades 4 through 6. Extrinsic and intrinsic children were then randomly assigned to success, failure, or control conditions. All children were given incomplete pictures and told to circle the missing parts. The children were given success, failure, or no feedback and then presented with anagrams to complete. The
extrinsic children performed significantly lower than did the intrinsic children on the task leading the researchers to conclude that negative feedback had more impact on extrinsic children than intrinsic children. A flaw in the design of the experiment was the lack of control for ability. Extrinsic children performed more poorly both after success and failure feedback than did the intrinsic children. The effect of lower ability on performing the anagram task was not addressed nor was the possibility that lower ability is related to extrinsic orientation. This is however, one of the few experiments performed in which the effect of success and failure feedback reactions were assessed.

**Aptitude**

Aptitude has received little attention in research on academic intrinsic motivation. Silon and Harter (1985) assessed the intrinsic versus extrinsic orientation of educable mentally retarded students as part of a study aimed at studying the appropriateness of various assessment techniques with the mentally retarded population. Although the results were not directly interpretable in terms of relation of intelligence to intrinsic motivation, there was a trend toward the extrinsic orientation.
Comparable Populations

The present study involved fourth and fifth grade students. According to Erickson (1963), a crucial issue at this age is the development of a sense of industry versus a sense of inferiority. Deci (1985) maintained that a feeling of competence and self-determination is vital in the development of intrinsic motivation. During this developmental stage, classroom environments may be very instrumental in the resolution of this issue for the child.

In surveying the research on intrinsic motivation, the vast majority of studies have dealt with adult populations. Of the forty-five studies which met the definitional criteria and were subsequently subjected to meta-analysis, only eight involved elementary school students (Rummel et al., 1988). Of those reviewed all eight showed that at the elementary level, intrinsic motivation was undermined by the introduction of extrinsic rewards. The experimental designs were basically the same. Rewards were given and then removed and the subsequent level of intrinsic motivation was measured.

Relationship of the Research to the Problem

Several studies have direct relevance to the present study. Deci, Nezlak, and Sheinman (1981)
hypothesized that students' intrinsic motivation would be affected by the classroom teacher. Students from grades four through six (N=889) completed Harter's (1981) intrinsic motivation scale and teachers completed an autonomy versus control orientation scale. These assessments were completed six weeks into the school year. In addition, the students completed the Harter scale seven months later. The teachers' orientations toward control/autonomy were significantly related to students' intrinsic motivation in the expected direction. The relationship remained stable after seven months. The results were interpreted to mean that in the six weeks prior to the initial assessment the teachers had already had a clear impact on the children's intrinsic motivation. This was an over generalization based on the available data. A second study was completed (Deci, Schwartz, Sheinman, & Ryan, 1981) to test the interpretation that teacher exert a direct influence on children's intrinsic motivation and that this occurs rather quickly. The design was the same with the exception of the initial assessment being completed on the second day of school. Intrinsic motivation was reassessed seven weeks later. Overall intrinsic motivation scores did not change significantly. In looking at the intrinsic scores for children in two classes with teachers who were extreme
in their orientations, the students' intrinsic motivation scores did change significantly. Intrinsic motivation increased in the classroom where the teacher was highly autonomy oriented. The results of the study were weak, but did provide evidence that while student intrinsic motivation is rather stable, it appears to be affected by teacher factors.

In both of these studies teacher orientation was determined through the use of an autonomy versus control rating scale. The teachers were presented with several school problem vignettes and were asked how they would respond in each situation. This provides evidence related to the teacher's general orientation but not to their actual teaching behavior and, as was demonstrated in the Brophy and Good (1970) and the Irvine (1986) studies, teachers react differently to different children. The present study sought to overcome this difficulty by the coding of actual teacher feedback with individual children in the classroom. Given the amount of time that teachers verbally communicate with their classes, it seemed appropriate to begin the investigation of the effect that the teacher has on student intrinsic motivation by first investigating the relationship between teachers' verbal feedback and student academic intrinsic motivation.
CHAPTER 3
Methodology

Subject Population and Selection of Sample

The subjects for the present study were 368 fourth and fifth grade students drawn from a total pool of 650 students from 30 classrooms. The classroom sizes ranged from 20 students to 25 students. The students were from three separate elementary schools in a rural county. Each school houses grades K through 6 and share the same curricula. The students were heterogeneously grouped for all instruction except reading.

Students were included in the present study if they met all of the following criteria: they were not repeating their current grade placement; they were not classified as Special Education students; they were present for all aspects of the data collection so that there were no missing data; and their parents did not object to their inclusion in the study.

Table 1 provides a description of the sample by grade and by sex.
Procedures

In mid October the students participated in the county wide group administration of the Cognitive Abilities Test (CogAT) (Thorndike & Hagen, 1985). The combined Verbal, Quantitative, and Nonverbal substest scores were used as the measure of student aptitude.

In December administrative personnel were asked for support of the study. Once received, the experimenter met with the fourth and fifth grade teachers. The teachers were told only that factors related to academic intrinsic motivation were to be studied. Permission was requested for an observer (either the school's guidance counselor or school psychologist) to observe and videotape on three separate occasions for periods of exactly 30 minutes during language arts instruction for the purpose of coding certain student behaviors. The teachers were assured that the videotapes would be destroyed and that their anonymity would be protected. They were further assured that no information would be used for administrative purposes (See Appendixes A and B). All teachers willingly volunteered to participate in the
Table 1

Description of Sample

<table>
<thead>
<tr>
<th></th>
<th>Male</th>
<th>Female</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Grade 4</td>
<td>86</td>
<td>104</td>
<td>190</td>
</tr>
<tr>
<td>Grade 5</td>
<td>93</td>
<td>85</td>
<td>178</td>
</tr>
<tr>
<td>Total</td>
<td>179</td>
<td>189</td>
<td>368</td>
</tr>
</tbody>
</table>
study.

Parents were informed of the study through a letter from the school division’s superintendent (Appendix C). They were told only that factors affecting academic intrinsic motivation were to be studied. They were asked to inform their child’s teacher if they wished for their child to be excluded from the study.

During the second week of January, the guidance counselor at each school administered *A Scale of Intrinsic Versus Extrinsic Orientation in the Classroom* (Harter, 1981) to the students. The guidance counselors followed exactly the instructions provided with the instrument and read each of the items to the students.

The classroom observers were the six guidance counselors and school psychologists. They were trained to use the *Teacher-Child Dyadic Interaction System* (Brophy & Good, 1969) to code teacher verbal feedback to the students. The observers were trained to code the entire range of teacher feedback reactions according to the definition and criteria presented by Brophy and Good (1969). The reactions were praise, affirmation, no reaction, negation, criticism, teacher giving answer, teacher asking another student, another student calling out, question repeated, question
rephrased, new question asked, and process. (See Appendix D.) The observers were trained through the use of videotapes of classroom instruction. The reliability of the coding was determined by the formula suggested by Brophy and Good (1969):

\[
\text{agreement} = 1 - \frac{A - B}{A + B}
\]

where A and B represented observational codings of two observers. Training continued until the agreement between observers was 85 percent.

The observations took place over a three week period of time. The observations were conducted only during language arts instruction. Observations were conducted during large group instruction and were not conducted on nontypical instructional days when the students were being tested or when the nature of the instruction did not allow for student-teacher interaction. Each teacher was observed by the same observer. The observer used a seating chart provided by the teacher to code each feedback reaction for each student. The observer coded teacher feedback during the actual observation. The classroom was videotaped during each observational period. The videotapes were used later for reliability checks. One observation period for each observer was observed and coded by the experimenter. The percentage of agreement ranged from 86 percent to 97 percent.
When the three observations for each teacher were completed, the feedback reactions for each child over the three observational periods were totaled and entered on a classroom chart (Appendix E).

The teachers were debriefed in group meetings following the completion of the data collection.

**Instrumentation**

The following provides descriptions and information related to the reliability and validity of the instruments which were utilized in exploring the proposed research questions.

Harter (1981) developed *A Scale of Intrinsic Versus Extrinsic Orientation in the Classroom* to measure student intrinsic/extrinsic orientation in the academic realm. Harter's definition of intrinsic motivation is consistent with Deci's conceptualization of intrinsic motivation in terms of competence and self-determination. The instrument was developed independently of the Cognitive Evaluation theorists but has been used extensively by researchers in seeking empirical support for the theory (Boggiano, Main, & Katz, 1988; Boggiano & Ruble, 1979; Deci et al., 1981; Green & Foster, 1986; Hennessey & Martinage, 1989).

The instrument consists of five subscales: preference for challenge versus preference for easy
work; curiosity/interest versus pleasing the teacher/getting good grades; independent mastery versus dependence on the teacher; independent judgment versus reliance on teacher’s judgment; and internal criteria versus external criteria (i.e., can the child judge success or failure). There is a total of 30 items on the scale with six items in each of the five subscales. The student is asked to decide which of two statements best describes that student and then to decide if the statement is really true or sort of true. A sample item is provided in Figure 1. Each item is scored on an ordinal scale from 1 to 4 with 1 indicating the maximum extrinsic orientation and 4 indicating the maximum intrinsic orientation.

Harter (1981) reported that over 3,000 students in grades three through nine from Connecticut, New York, Colorado, and California participated in the development of the scale. Each grade level was equally represented. There was approximately an equal number of boys and girls. The socioeconomic level of the students ranged from lower-middle to upper-middle income. Following a pilot study with 130 children, the
Figure 1. Sample items from the Harter (1981) scale.

<table>
<thead>
<tr>
<th>Sample Questions</th>
<th>Really True for Me</th>
<th>Sort of True for Me</th>
<th>Sort of True for Me</th>
<th>Really True for Me</th>
</tr>
</thead>
<tbody>
<tr>
<td>(a) Some kids would rather play outdoors in their spare time</td>
<td>□</td>
<td>□</td>
<td>BUT Other kids would rather watch T.V.</td>
<td>□</td>
</tr>
<tr>
<td>(b) Some kids like hamburgers better than hot dogs</td>
<td>□</td>
<td>□</td>
<td>BUT Other kids like hot dogs better than hamburgers</td>
<td>□</td>
</tr>
</tbody>
</table>
scale was group administered to 1121 children grades three through six. Five discrete factors emerged as predicted by the initial model.

Factorial validity was established by analyses performed on data from 1554 students grades three through nine. The same factorial pattern found in the pilot studies emerged. The average loadings for the five subscales were .53 on preference for challenge/preference for easy work, .50 on curiosity/pleasing teacher, .46 for independent mastery/dependence on teacher, .50 for independent judgment/reliance on teacher, and .54 for internal criteria/external criteria. Similarity in factor patterns across samples was established by congruence coefficient correlations of .67 to .84.

Intercorrelations between the first three subscales, challenge, curiosity, and mastery ranged from .34 to .61. Intercorrelations between the last two subscales, judgment and criteria, and the other three subscales were low, leading Harter to conclude that the scale consisted of two factors. The first was a motivational factor consisting of the challenge, curiosity, and mastery subscales. The second factor consisted of judgment and criteria subscales and was informational in nature and not motivational.

In order to explore discriminant validity of the
Harter (1981) administered the scale to lower-middle class students in a public traditional school and to upper-middle class students in a private open school hypothesizing that more of the factors which have been shown to enhance intrinsic motivation were present in the open school situation. Students at the open school demonstrated significantly higher intrinsic motivation scores than did the students at the traditional school.

Harter (1981) provided evidence for predictive validity of the preference for challenge subscale. Children were allowed to choose 3, 4, 5, or 6 letter anagrams. A correlation of .72 was found between the mean number of letters chosen by the children and the scores on the preference for challenge subscale.

Harter (1982) also explored construct validity. According to Harter, perceived competence in one's ability is positively related to intrinsic motivation. To test this hypothesis and to provide construct validity, the scale was administered to approximately 2000 students grade 3 through 6 along with a scale measuring the students' perceived competence. Perceived competence correlated .57 with the challenge subscale, .33 with the curiosity subscale, and .54 with the independent mastery subscale. When the three subscales were combined into one motivational
orientation score, the correlation with the perceived competence score was .52 for elementary students and .58 for junior high students (Harter, in press).

Correlational support for convergent validity of the scale was provided by Gottfried (1985). The Children's Academic Intrinsic Motivation Inventory (CAIMI) (Gottfried, 1985) and A Scale of Intrinsic Versus Extrinsic Orientation in the Classroom (Harter, 1981) were administered to 166 white middle-class boys and girls in Grades 5 through 8. The three motivation subscales of the Harter instrument correlated positively with all scales (reading, math, social studies, science, and general) of the CAIMI with significance at .05 or better. The strongest correlations were found between the CAIMI General subscale and the three motivational subscales of the Harter instrument. The Challenge subscale correlated .62, the Curiosity subscale correlated .41, and the Mastery subscale correlated .35 with the General subscale of the CAIMI. These correlations were significant at .001 level. Gottfried concluded that the correlations demonstrated appropriate convergence but not duplication (1985).

Harter (1981) reported reliability coefficients ranging from .68 to .84 within each of the five subscales administered to 1121 students. Test-retest
reliabilities of .58 to .76 after a 5 month period and .48 to .63 after 1 year were reported.

The instrument which was used for coding teachers' verbal feedback to students is the Teacher-Child Dyadic Interaction System (Brophy & Good, 1969). This system allows for a single observer to record all the verbal interactions between the teacher and each individual child in the classroom. The seven behavioral categories include response opportunities, level of question, quality of child's response, teacher's feedback reactions, work-related contacts, behavior evaluations, and procedural contacts. Data may be collected using all seven behavioral categories or just the category of particular concern. The data collected is scored by frequency counts for each type of feedback for each child. The frequencies are then converted to either counts per period of time or percentages.

Brophy and Good (1972) reported 80 percent or better agreement between four different observers within one to two weeks of training when the entire coding system was being used and 60-90 percent agreement after only a short training time of 5 to 20 minutes if individual categories were being coded (Good and Brophy, 1984). Irvine (1986) reported interobserver agreement of .80 to 1.0 following 40
hours of intensive training in coding three categories of behaviors.

Brophy and Good (1969) stated that since the system involved objective coding of observable behavior, content validity is ensured if recommended procedures are followed. The coding system has been used to distinguish teacher interactions with students of various characteristics. Kedar-Voivodas (1983) reviewed studies in which teacher-child interactions were coded and then compared to the teachers descriptions of the individual children as attached, rejected, concerned, and indifferent. The coding system revealed differential teacher interactions with the different groups of children. Irvine (1986) and Simpson and Erickson (1983) used the coding system to differentiate between teacher-student interaction for black/white and boy/girl.

The Cognitive Abilities Test Form 4 (CogAT) (Thorndike & Hagen, 1985) is a group administered measure of scholastic ability. It consists of 10 subtests grouped into three batteries, verbal, quantitative, and nonverbal. The standardization sample of 161,230 was chosen to represent the national school population as reported for the 1980 census. Raw scores are transformed into standard age scores which are normalized standard scores with a mean of 100 and a
standard deviation of 16. Kuder-Richardson reliabilities computed within grades ranged from .89 to .96. Test-retest reliabilities when the test was completed six months later using the same form ranged from .76 to .94. When the scales were correlated considerable overlap was found. Across grades a median correlation of .78 was reported.

Content validity was established by correlating the test with the Iowa Test of Basic Skills (ITBS). The highest correlations are between the verbal battery and the ITBS subtests (.70s to .80s). Construct validity was demonstrated with correlations of .65 to .75 between the CogAT and the Stanford Binet Test of Intelligence.

Research Design

The following represents the regression model for the present study:

\[ Y = b_1X_1 + b_2X_2 + b_3X_3 + b_4X_4 \]

where \( Y \) = score of intrinsic motivation measure (dependent variable)

\( X_1 \) = score of the CogAT (aptitude measure)

\( X_2 \) = positive feedback

\( X_3 \) = negative feedback

\( X_4 \) = grade level (used to control for
any differences due to grade level)

$b_1$, $b_2$, $b_3$, and $b_4$ are estimates of the
regression coefficients.

**Hypotheses**

The following hypotheses were proposed:

1. There is a significant positive correlation
   between student academic intrinsic motivation
   and the amount of positive verbal feedback
   provided by the teacher to the student.

2. There is a significant negative correlation
   between student academic intrinsic motivation
   and the amount of negative verbal feedback
   provided by the teacher to the student.

3. There is a significant positive correlation
   between student academic intrinsic motivation
   and the student's aptitude for school work.

4. Positive verbal feedback, negative verbal
   feedback, and aptitude for school work
   contribute significantly to the total
   variance of academic intrinsic motivation.

**Statistical Analysis of Data**

Each student was assigned an identification number.
A spread sheet was developed with the following
information listed by columns for each student: school,
teacher, grade, sex, ability, intrinsic motivation score, processing feedback, praise feedback, positive feedback, neutral feedback, negative feedback, critical feedback, answer given by teacher, teacher asked another student, call out by another student, question repeated, clue given, new question asked, and total feedback.

A single composite score for the CogAT was determined by first averaging the Verbal, Quantitative, and Nonverbal subscale scores and then converting that average through the use of tables provided by Thorndike and Hagen (1985). The composite scores on the CogAT could range from 50 to 150.

Scores from only the three subscales of A Scale of Intrinsic Versus Extrinsic Orientation in the Classroom (Harter, 1981) which purport to measure academic intrinsic motivation were used. Scores from the preference for challenge, curiosity, and independent mastery subscales were used to compute one intrinsic motivation score. A mean score was computed for each student in the manner recommended by Harter (1986). The mean scores could have a range of 1.0 to 4.0.

The data accumulated during the observation sessions were converted to frequency counts. For each student the amount of teacher verbal feedback in all categories was totaled over the three observation periods. Only those students who were present for the
three entire observational periods (90 minutes) were included in the study.

Statistical analysis was conducted through the use of the Statistical Package for the Social Sciences – PC (SPSS-PC).

A factor analysis was conducted to determine which feedback reactions would cluster to form positive and negative factors. A varimax rotation was utilized to maximize the interpretation of the factors. By default SPSS-PC selected factors with Eigenvalues of greater than or equal to 1. For future analyses only those feedback reaction categories that had Eigenvalues of +.60 or greater were included with each identified factor. Individual scores for each of the identified factors were determined by adding the values of the feedback reaction categories that had loaded heavily on a given factor.

Descriptive statistics including frequencies, means, median, modes, ranges, and standard deviations were obtained for all variables in the study.

In order to obtain information regarding relationships between the variables, correlations between all variables were determined. The significance level was \( p < .05 \).

A multiple regression analysis was run in which academic intrinsic motivation was entered as the
dependent variable and aptitude, positive feedback, and negative feedback were entered as independent variables. The independent variables were entered into the equation by the stepwise method. Significance of $p < .05$ was employed.

An analysis of the residuals was used to determine whether the assumptions necessary for a regression analysis were violated. First it was determined if there were any outliers or cases with large residuals. Any case with standardized residuals greater than 3 or less than $-3$ was examined.

To investigate if the assumption of normality had been violated, a histogram of the residuals was constructed to determine if the residuals showed a normal distribution. Additionally a normal probability plot was constructed with the distribution of residuals plotted against the expected distribution of residuals to determine if a straight line existed indicating a normal distribution.

Residuals were plotted against the predicted values on a standardized scatterplot to determine if the assumption of linearity had been violated. The lack of a pattern would indicate the necessary lack of relationship between the predicted and residual values.

An analysis of the standardized scatterplot was employed to determine if the assumption of equality of
variance had been violated. To assure that the assumption of equality of variance had not been violated, the lack of a systematic increase or decrease of the residuals with the predicted values would be needed.
CHAPTER 4

Results

Descriptive Analysis

Summary descriptive statistics for the study are shown in Table 2. The aptitude score represents a composite score of the verbal, nonverbal, and quantitative subtests of the COGAT (Thorndike & Hagen, 1985) and reflects students' aptitude for academic work. The mean of 102.85 and standard deviation of 16.13 compare to the COGAT mean of 100 and standard deviation of 16.

The scores for intrinsic motivation were determined by finding the mean scores for the three subscales of A Scale of Intrinsic Versus Extrinsic Orientation in the Classroom (Harter, 1981) which constituted the academic intrinsic motivation factor of that instrument. The subscales used to compute the intrinsic motivation score were preference for challenge, curiosity, and independent mastery.
Table 2

Descriptive Statistics for Variables in the Study

<table>
<thead>
<tr>
<th>Variable</th>
<th>Mean</th>
<th>SD</th>
<th>Minimum</th>
<th>Maximum</th>
<th>Median</th>
</tr>
</thead>
<tbody>
<tr>
<td>Aptitude</td>
<td>102.85</td>
<td>16.13</td>
<td>62.00</td>
<td>150.00</td>
<td>102.00</td>
</tr>
<tr>
<td>Intrinsic Motivation</td>
<td>2.76</td>
<td>.62</td>
<td>1.00</td>
<td>4.00</td>
<td>2.81</td>
</tr>
<tr>
<td>Positive Feedback</td>
<td>3.43</td>
<td>3.31</td>
<td>.00</td>
<td>23.00</td>
<td>3.00</td>
</tr>
<tr>
<td>Negative Feedback</td>
<td>.51</td>
<td>.90</td>
<td>.00</td>
<td>7.00</td>
<td>.00</td>
</tr>
</tbody>
</table>
subscales. The mean of 2.76 and standard deviation of .62 found in the present study compare to the mean of 2.79 and standard deviation of .70 reported by Harter (1981) in the norming sample.

The feedback scores were determined by the coding of actual teacher verbal feedback reactions to students' responses. The feedback scores were the frequency counts over the three 30 minute observational periods. Any student was eliminated from the study if present for less than the total 90 minutes of observational time.

Factor analysis of the 11 verbal feedback reaction categories revealed four factors with Eigenvalues greater than 1.0. The loadings of the different categories of verbal feedback reactions with the four factors are shown in Table F-1.

Two of the verbal feedback categories, praise and positive, each had factor loadings of .72 with the first factor. Factor 1 was designated as the positive verbal feedback factor. Factor 2 was designated as the processing verbal feedback factor due to the high loadings of the processing (.76) and repetition of questions (.78) verbal feedback categories. Loadings on the third factor were not as strong with neutral (.59) and asking new question (.61) verbal feedback categories loading with that factor. Factor 3 was
designated the neutral factor. Factor 4 was designated as the negative factor. The negative feedback (.62) and asking another student (.82) categories were the two verbal feedback reaction categories which loaded at an acceptable level with this factor.

Of interest in this study were the positive and negative feedback factors. Based on the factor analysis, positive feedback was determined by combining each student's scores from the praise category and the positive category. Negative feedback was determined by combining each student's scores from the negative category and the asking other category.

The range of scores for the positive verbal feedback factor and the negative verbal feedback factor were quite different as shown in Table 2. Sixty-six percent of the students observed during the study received no negative verbal feedback from the teacher as opposed to only 13 percent of the students receiving no positive feedback from the teacher.

There was a total of 1945 verbal feedback reactions coded. Of those, only 187 comprised the negative feedback factor. Only 5.4% of the students received no verbal feedback of any kind during the observations.
Hypothesis 1:

There is a significant positive correlation between student academic intrinsic motivation and the amount of positive verbal feedback provided by the teacher to the student.

Correlations between all pairs of variables were determined by use of the Pearson product-moment correlation coefficient. The correlation matrix in Table 3 shows that there was a significant (p < .05) correlation of .13 between academic intrinsic motivation and positive verbal feedback.

Insert Table 3 about here

Hypothesis 2:

There is a significant negative correlation between student academic intrinsic motivation and the amount of negative verbal feedback provided by the teacher to the student.

The correlation matrix in Table 3 indicates that negative feedback was not correlated with academic intrinsic motivation. The negative correlation of .02 was not significant at the .05 level of confidence.
Table 3
Pearson Product-Moment Correlation Coefficients for Pairs of Variables

<table>
<thead>
<tr>
<th></th>
<th>IM</th>
<th>Grade</th>
<th>Sex</th>
<th>Aptitude</th>
<th>Positive Feedback</th>
<th>Negative Feedback</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Intrinsic Motivation</strong></td>
<td>-.13*</td>
<td>.10</td>
<td>.23**</td>
<td>.13*</td>
<td>-.02</td>
<td></td>
</tr>
<tr>
<td><strong>Grade</strong></td>
<td>-.13*</td>
<td>-.07</td>
<td>.00</td>
<td>-.08</td>
<td>-.02</td>
<td></td>
</tr>
<tr>
<td><strong>Sex</strong></td>
<td>.10</td>
<td>-.07</td>
<td>.08</td>
<td>-.05</td>
<td>-.04</td>
<td></td>
</tr>
<tr>
<td><strong>Aptitude</strong></td>
<td>.23**</td>
<td>.00</td>
<td>.08</td>
<td>.09</td>
<td>-.01</td>
<td></td>
</tr>
<tr>
<td><strong>Positive Feedback</strong></td>
<td>.13*</td>
<td>-.08</td>
<td>-.05</td>
<td>.09</td>
<td>.19**</td>
<td></td>
</tr>
<tr>
<td><strong>Negative Feedback</strong></td>
<td>-.02</td>
<td>-.02</td>
<td>-.04</td>
<td>-.01</td>
<td>.19**</td>
<td></td>
</tr>
</tbody>
</table>

*p < .05, two-tailed

**p < .001, two-tailed
Hypothesis 3:

There is a significant positive correlation between student academic intrinsic motivation and the student's aptitude for school work.

The correlation matrix in Table 3 indicates a positive correlation of .23 ($p < .001$) between academic intrinsic motivation and aptitude for school work.

Hypothesis 4:

Positive feedback, negative feedback, and aptitude for school work contribute significantly to the total variance of academic intrinsic motivation.

Aptitude, positive verbal feedback, negative verbal feedback, and grade level were entered into the regression equation by the stepwise method as potential predictors of academic intrinsic motivation. Aptitude ($p < .001$), grade ($p < .01$), and positive verbal feedback ($p < .05$) were then entered into the equation as significant predictors of academic intrinsic motivation. Negative verbal feedback did not contribute significantly to the total variance of academic intrinsic motivation and was not entered into the regression equation. Table 4 summarizes the variables in the equation.

Place Table 4 about here
Table 4

Summary Statistics for Variables in the Multiple Regression Analysis

<table>
<thead>
<tr>
<th></th>
<th>Multiple R</th>
<th>R²</th>
<th>Adjusted R²</th>
</tr>
</thead>
<tbody>
<tr>
<td>Aptitude</td>
<td>.23282</td>
<td>.05421</td>
<td>.05162</td>
</tr>
<tr>
<td>Grade</td>
<td>.26804</td>
<td>.07184</td>
<td>.06676</td>
</tr>
<tr>
<td>Positive Feedback</td>
<td>.28657</td>
<td>.08212</td>
<td>.07456</td>
</tr>
</tbody>
</table>
Aptitude, grade level, and positive feedback contributed about eight percent to the total variance of academic intrinsic motivation. Aptitude was responsible for approximately five percent of the total variance and grade and positive verbal feedback contributed equally to the remaining three percent of variance.

Assumptions

An analysis of residuals was conducted to determine if the necessary assumptions for regression analysis had been violated.

The assumption of normality was investigated through the construction of a histogram and a normal probability plot. The histogram showed no outliers beyond 3.00 standard deviations from the mean. On the normal probability plot, the observed distribution of residuals versus the expected distribution formed a straight line indicating normality.

The assumption of linearity was established through a standardized scatterplot with the residuals plotted against the predicted values. The lack of a pattern indicated no relationship between the predicted and residual values.

The scatterplot was also examined for violations of equality of variance. The spread of the residuals did not appear to systematically increase or decrease
with the predicted values. The assumption of equality of variance did not appear to be violated.

**Supplemental Data Analyses**

Additional correlations besides those specifically named in the hypotheses are shown in Table 3. A negative correlation of .13 ($p < .05$) was found between academic intrinsic motivation and grade level. The level of academic intrinsic motivation was less with the fifth grade students than with the fourth grade students. Both positive verbal feedback and negative verbal feedback were negatively correlated with grade (0.08 and 0.02 respectively). Fifth grade students received less positive and negative verbal feedback than did the fourth grade students.

The negative correlations found between sex and both positive verbal feedback and negative verbal feedback indicate that girls received less positive and negative feedback than did the boys (boys were coded 1 and girls were coded 2 for the statistical analysis).

Aptitude was negatively correlated with negative verbal feedback (0.02) and positively correlated with positive verbal feedback (0.09). Lower ability students tended to receive more negative verbal feedback than did the higher ability students. Higher ability students tended to receive more positive feedback than did the lower ability students.
CHAPTER 5
Discussion

The purpose of this study was to investigate the relationship between academic intrinsic motivation and positive teacher verbal feedback, negative teacher verbal feedback, and student aptitude for academic work. The research questions evolved from the Cognitive Evaluation Theory of Edward Deci (Deci & Ryan, 1985) in which intrinsic motivation develops out of a sense of competence and self-determination. In that teacher verbal feedback to students would provide messages about their academic competence, it was hypothesized that positive verbal feedback would enhance intrinsic motivation and negative verbal feedback would be detrimental to intrinsic motivation.

The subjects for the study were 368 fourth and fifth grade students. Student academic intrinsic motivation was measured by a questionnaire developed by Harter (1981). Aptitude was assessed with the Cognitive Abilities Test (Thorndike & Hagen, 1985). Negative and positive teacher verbal feedback reactions were determined by classroom observers who coded all
teacher verbal feedback reactions to the students in accordance with the observation system developed by Brophy and Good (1969). Through factor analysis the feedback categories of praise and positive feedback were combined to form the positive feedback factor. The verbal feedback categories of negative feedback and teacher asking another student for the answer were combined to form the negative verbal feedback factor.

Results revealed that both aptitude and positive verbal feedback correlate positively with academic intrinsic motivation. There was no correlation between negative verbal feedback and academic intrinsic motivation. Aptitude for school work, positive verbal feedback, and grade level (entered into the regression equation as a control for differences due to age) contributed about 8% of the total variance of intrinsic motivation. Negative verbal feedback did not contribute to the prediction of the level of intrinsic motivation.

The descriptive analysis of the data revealed that for both aptitude and intrinsic motivation the students in the present study approximated the norming groups for the two instruments. Since the limitations for students participating in this study were strict, the study eventually involved only 368 students out of a possible 650. The students’ performances on both the
aptitude measure and the academic intrinsic motivation measure commensurate with the norming groups for the instruments would seem to indicate that the attrition of students from the study did not cause a skewed distribution.

There was considerable difference in amounts of positive and negative feedback reactions given to the students across the entire sample of students. All but five percent of the students received some type of feedback during the observations indicating that the teachers did provide feedback opportunities to most of the students. Because of the limited negative verbal feedback provided all conclusions must be made cautiously.

The results of the study supported the hypothesis that positive verbal feedback from the classroom teacher would correlate positively with student academic intrinsic motivation. According to the Cognitive Evaluation Theory (Deci & Ryan, 1985), intrinsic motivation is in part dependent on an individual's sense of competence. Any factor which would contribute to a sense of competence should lead to increased intrinsic motivation. In the academic realm, teachers provide feedback to their students conveying information about success or failure. A student's sense of competence would be affected by such
information. Praise and the affirmation of correct answers which comprised the positive verbal feedback factor in the present study, according to the Cognitive Evaluation Theory, would lead to an increased sense of competence and to the enhancement of the intrinsic motivation.

While the effect of positive feedback on intrinsic motivation has been demonstrated in controlled experiments, little attention has been given to the effect of positive feedback on intrinsic motivation in the classroom. The results of the present correlational study lend support to those controlled studies by demonstrating that positive verbal feedback is positively associated with academic intrinsic motivation as measured in the natural setting of the classroom.

While the results provide support for the hypothesis that positive feedback is positively related to intrinsic motivation, the magnitude of the relationship would indicate that other factors exist which effect intrinsic motivation. In addition to the sense of competence, the Cognitive Evaluation Theory (Deci & Ryan, 1985) hypothesizes that a sense of self determination is necessary for intrinsic motivation. The present study did not assess any of the teachers’ actions which might have led to a sense of self
determination. Studies which have assessed the degree of autonomy provided by the teacher have demonstrated the enhancing effects of those classrooms on academic intrinsic motivation (Deci et al, 1981, Green & Foster, 1986). One of the possible explanations for the low amount of variance in intrinsic motivation attributed to positive verbal feedback (and the conveying of a sense of competence) may be that if intrinsic motivation develops out of a sense of competence and a sense of self-determination (Deci & Ryan, 1985) the focus of the present study was too restricted by looking only at the conveyance of a sense of competence.

The second hypothesis of the study, that negative verbal feedback from the teacher would be associated with lower intrinsic motivation, was not substantiated. The correlation between negative verbal feedback and intrinsic motivation was not significant at the .05 level of confidence. According to Deci (1987), negative feedback would decrease the sense of competency and would, therefore, decrease the level of intrinsic motivation. The results of this aspect of the present study must be interpreted cautiously due to the limited range of negative feedback reactions. Students received a disproportionate amount of positive verbal feedback in comparison to the negative verbal feedback. Sixty-six percent of the students received
no negative verbal feedback while only 13% received no positive verbal feedback. Although the teachers were uninformed about their verbal behaviors being coded, it is very possible that many of the teachers attempted to put the best foot forward while the visitor was in the room. It is also possible that the teachers did not provide the full range of difficulty of questions so that the students were not presented with questions for which they did not have the answers. Additionally, the study was conducted during a small segment of the school day. The nature of a teacher’s verbal feedback to students could be different during the various aspects of the total school day.

Deci and Chandler (1986) suggested that since failure was inevitable, the effects of negative feedback could be lessened if the feedback was nonevaluative and was given in such a way that the failure could be portrayed as a problem to be solved. The processing verbal feedback reaction in the present study presented such an opportunity. This was coded when a student missed a question and the teacher provided additional information and helped the student to develop the correct answer. The relationship in this study between processing verbal feedback and intrinsic motivation was similar to the relationship between negative verbal feedback and intrinsic
motivation. The results do not provide support for the contention that processing feedback is substantially different from negative feedback on intrinsic motivation.

The results of the study supported the hypothesis that aptitude would correlate positively with academic intrinsic motivation. In terms of the Cognitive Evaluation Theory, the more capable a student, the more likely that student is to experience success. Success in school leads to a sense of competence and therefore, intrinsic motivation is enhanced. The results are consistent with those found by Gottfried (1985, 1990) and Silon and Harter (1985). The results also revealed a trend toward more positive teacher feedback and less negative teacher feedback for the more capable students and more negative feedback and less positive feedback for the less capable students. This pattern could also contribute to differences in a sense of competency experienced by students in a classroom.

Aptitude and positive verbal feedback combined positively in a multiple regression equation to predict academic intrinsic motivation. Aptitude for school work provided five percent of the variance in academic intrinsic motivation while positive verbal feedback and grade level contributed to the remaining three percent found in the present study. In terms of intrinsic
motivation reflecting in part, a person's sense of competence, these results would seem to indicate that a person's aptitude for being successful is a more salient conveyer of competence than feedback from another individual. The negative feedback factor did not contribute to the prediction of intrinsic motivation in the present study. This would lend itself to the above explanation, however, due to the very limited amount of negative verbal feedback given, it is impossible to draw conclusions relative to the effect of negative verbal feedback.

The additional finding that academic intrinsic motivation tends to decrease with age was found, although the results must be interpreted cautiously as only two grade levels were involved in the present study. This is consistent with both Harter (1981) and Gottfried (1985). Both of these researchers suggested that the decrease in academic intrinsic motivation with age was related to school experiences which stifle students' enthusiasm for learning. One factor in the school experience would be teacher verbal feedback. The present study did not reveal a substantial change in the verbal feedback patterns between the two grades. Neither positive feedback nor negative feedback correlated with grade level. There was a trend toward more feedback, both positive and negative, at the upper
grade level.

The present study was limited by restricted range of classroom observations. The problem could be overcome by increasing the number of observations. More observations of shorter durations would allow for a more accurate, comprehensive look at the classroom especially if the observations were made randomly throughout the school day.

Findings of the study suggest that positive verbal feedback is positively related to academic intrinsic motivation. Aptitude of the student is also related to the level of academic intrinsic motivation. The implications would be that students of all aptitude levels need to receive appropriate positive verbal feedback. If success aids in the student's perception of competence, then opportunities should be provided where the student could be successful and receive genuine, accurate positive verbal feedback.

The present study focused on verbal feedback in the classroom. While positive verbal feedback, aptitude, and grade level were found to relate in positive fashion to academic intrinsic motivation, a large amount of the variance in intrinsic motivation was left unexplained by the present study. Future studies should expand the classroom variables to be investigated which affect both the sense of competence
in students and the sense of self-determination. With some modifications, the technique used in the present study appears to be a viable method for study of the actual classroom environment. In addition to allowing for measurement of actual classroom experiences, the results from the use of the observational system could and should be used with classroom teachers to help them evaluate and make appropriate changes in their classrooms.

Finally, the effect of negative feedback needs additional research as the present study was inconclusive as to the effects of negative verbal feedback on academic intrinsic motivation.
Appendixes
Appendix A

Letter to Teacher from Experimenter
Dear [Teacher's Name],

The purpose of this letter is to ask for your cooperation as I collect data for my doctoral dissertation. I am investigating factors which affect students' intrinsic motivation for school work. The first step in gathering data is to have all fourth and fifth grade students complete a short survey of academic intrinsic motivation. The next step would be to have three separate 30 minute classroom observations. In order to do this as efficiently as possible and not to disrupt your classroom activities, I propose to have those observational periods taped for analysis at a later time. Your school's guidance counselor and school psychologist will be assisting me in the observations.

I assure you that once the data is collected, the tapes will be destroyed. All students and teachers will remain anonymous. None of the information will be used for administrative purposes. At the completion of the study, I shall share the results with you.

I would appreciate your assistance in this project. If you have concerns or questions, please feel free to call and discuss them with me. If you agree to allow your classrooms to be observed, please sign below and return the form to either the guidance counselor or school psychologist. Thank you very much for your help!

Sincerely,

Ann J. Wickwire

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I give permission for my classroom to be observed. I understand that I will remain anonymous if I participate.
Appendix B

Letter to Teacher from School Superintendent
Dear Teachers:

I am writing to encourage you to participate in the research project that is proposed by Mrs. Ann Wickwire. The research is a requirement for the completion of her work on her doctoral degree. I have given my approval to the project because I feel that the study will provide valuable insight into the factors which contribute to the development and maintenance of intrinsic motivation in the academic world. At a time when much emphasis is on academic achievement, we find that more and more of our children become disinterested in their school work. It is vital that we explore the reasons for this in order to address the problem effectively.

Mrs. Wickwire has assured me that all teachers and students will remain completely anonymous. Thank you for your cooperation with this project.

Sincerely,

William G. Thomas
Superintendent of Schools
Appendix C

Letter to Parents
Dear Parents:

The purpose of this letter is to notify you of a research project that will be conducted by Ann Wickwire, Director of Pupil Personnel Services. Mrs. Wickwire will be investigating the factors which affect a student’s intrinsic motivation for school work.

The research will involve all fourth and fifth grade students in Louisa County. The students participating in the study will complete a short survey (5-10 minutes) having to do with student motivation for school work. Observational information will then be collected during three observational periods. To aid the observer, the classrooms will be videotaped. After the videotapes have been analyzed, they will be destroyed. No student in this study will be singled out or identified in any way. All students will remain anonymous.

If you do not wish for your child to participate in this study, please notify your child’s teacher, principal, or Mrs. Wickwire. Mrs. Wickwire is available at (703) 894-5133 to answer any questions which you may have. Thank you for your cooperation in this important project.

Sincerely,

William G. Thomas
Superintendent of Schools
Appendix D

Training Information for Use of
Teacher-Child Dyadic Interaction System
TEACHER'S FEEDBACK REACTION

To facilitate comparison of examples of teacher feedback reactions to the answers of the children, examples will be given with reference to three typical teacher questions and child answers. The three situations are as follows:

Question one: What color is this? (the correct answer is "Red")

Question two: What word is this? (the word is "Bad") This question might be asked as stated or might be implied during the reading group, as when a child is reading but gets stuck when encountering the word "bad".

Question three: How do you think John feels? (the answer is "Bad" or any one of its synonyms)

Examples of teacher feedback reactions which might be made to the child's answers (or failures to answer) to the previous questions are presented below. Under each heading the feedback reactions following the number 1 refer to reactions to question one; those following the number 2 refer to reactions to question
two; and those following the number 3 refer to the reactions to question three. Additional material and discussion of special situations will appear after the examples for each of the twelve categories of teacher's feedback reactions.

Praise

1. "Red!" (delivered with gusto and warmth)
   "Right -- it's red. Good, Johnny."
   "Good." (said in response to a child who has given the correct answer)
   "Yes, you really know your colors, don't you!"

2. "Good -- you remembered didn't you!"
   "Bad! Very good, Johnny."
   "Right -- you figured that out all by yourself, didn't you!"

3. "Yes, I think you're right, Johnny, that's good thinking."
   "Right, Mary! You read the story and found out how Johnny felt, didn't you?"

Affirmation of Correct Responses

Affirmation of correct answers would be very similar for all three types of questions. The teacher would indicate that the answer is correct either
verbally (Yes, um-hum, right, that's right, okay, etc.) or nonverbally (nodding the head up and down). Repetition of the child's answer is also coded as affirmation unless it is delivered in a questioning tone of voice. Any of the verbal affirmation statements might be included as part of a teacher feedback reaction coded as praise if the verbal content were accompanied with nonverbal communication of warmth, joy, or excitement. When not so accompanied they are coded as verbal affirmation only.

No Feedback Reaction

The teacher is coded for no verbal reaction if he simply does not respond to the child following his answer or if he makes a verbal response which does not communicate information about the correctness or incorrectness of the child's answer. Examples of the latter: "You think it's red;" "I never thought of that."

Negation of Incorrect Answers

Indication that the child's answer is incorrect in whole or in part is coded as negation assuming that the response is confined to informational feedback and is not codable as criticism. As with affirmation, negation can be expressed nonverbally by shaking the
head or verbally (no, that’s wrong, that’s not right, I
don’t think so, uh-uhh, etc.).

**Criticism**

Teacher feedback reactions coded as criticism include negation accompanied by gestural or expressive communication of anger, rejection, or frustration as well as direct verbal criticism:

"Maybe you’d know if you’d pay attention."
"You wouldn’t make mistakes like that if you tried harder."
"Don’t guess -- look at the word. You should know better than that."
"I told you to raise your hand before answering -- weren’t you listening?"
"We’ve been over this three times already, John -- you should know it by now."
"That’s not right -- what’s the matter with you?"

**Process Feedback**

1. Process feedback is not possible in reaction to the child’s answer to the first question, since the question deals with the arbitrary linguistic label which the English language attaches to the color "red." These and equivalent questions involve basic facts which must be simply memorized rather than explained.
Since the correctness of the correct answer resides in arbitrary societal consensual agreement rather than in the presence of a logically based sequence or process, no process feedback is possible. In addition to color labels, other categories of questions which do not admit of process feedback include spelling, traffic signs and turn signals, and the interrelationships among units in systems of measurement. Thus process feedback could be given to a child when the question involves telling time from the clock, but not when the question concerns the number of minutes per hour or the number of hours per day.

2. Johnny, in order to read the word you have to sound it out (followed by a demonstration of how to sound out the word). When you don't know the word you can sometimes figure it out by thinking about the story so far and by looking at the picture (followed by an extended explanation of how the child might have figured out the word was "bad" by figuring out that Johnny felt bad in the story and that the particular sentence was describing how Johnny felt).

3. To figure out how Johnny feels you have to think about the story and about what happens to him (followed by a discussion of significant events in the
story which would suggest that Johnny feels "bad").

Gives Answer

1. It's red. We call this color red. It's red, just like a stop light.
3. I think John probably feels bad. He doesn’t feel very good, does he? He is very unhappy. (assuming the teacher equates this with "bad") He feels awful.

Asks Other

Here the teacher does not provide the answer for the child but instead asks for someone else to provide it:

Does anyone know?
Mary, can you tell me?
Can someone help John?
What is it, class? (the teacher may call for a chorus response rather than ask for a single child to respond)

Call Out

Call out is sometimes coded for the teacher's feedback reaction (although it is not a teacher response) if some other child calls out the correct
answer when the first child gives an incorrect answer or is unable to respond. This includes both instances in which the child who calls out the answer is coded for response opportunity (because the teacher then turns his attention to him and makes a feedback response) and instances in which the child who calls out the answer does not get coded for a response opportunity (the teacher does not turn his attention to him and give specific individual feedback). Thus call out is coded in teacher's feedback reaction whenever the child gets feedback from another child who in fact calls out the answer; it is not necessary that the teacher give feedback to the child who called out the answer.

Repeats Question

1. What color? Well? Do you know?
2. Do you know that word? Are you stuck? What is it?
3. How does he feel? What do you think? Hmmm?

Rephrase or Clue

1. Is it red or blue? Is it red? Is it blue? It's the same color as a stop light. It's our new color for today. It begins with "r". It rhymes with "bed".
2. Is it bad? Is it had or bad? Does he feel good or bad? Look at the first letter. What word does it rhyme with? We just had this word up here (pointing). How does Johnny feel? He feels _____?

3. Does he feel good or bad? Does he feel bad? Well, is he happy, sad, angry, or what? Look at his face. He’s never going to see Sam again. How would you feel if you were Johnny? How does he look?

New Question

1. Yes, and what color is this? What else is red? Are you wearing anything that’s this color?

2. Why did he feel bad? Is he crying? Did you study this story? How do you spell that word?

3. And how does Sam feel? Yes, how could you tell that he was sad? Then what happens? Why does he feel sad?

In general, the teacher’s feedback to the child is coded as process feedback if he explains why an answer is wrong or if he explains what to do in order to get the right answer. If the original question was a process question, the teacher will be giving process feedback simply by giving the answer to that question. This includes the extreme case in which the child has answered the question correctly and the teacher
responds merely by repeating the child’s process answer. Except for the special case of process questions, however, the teacher must go beyond simply giving the answer to the original question in order to get credit for process feedback. For example, the teacher may be observing a child writing his name on the board. If she merely says "No, Johnny, you put a little 'j', your name begins with a capital 'J','" she would be coded for product feedback. However, if the teacher explained about names being proper nouns and proper nouns always being identified with an initial capital letter, she would be coded for process feedback.

The teacher may sometimes be credited with process feedback when this feedback is apparently not understood and therefore not successful. The key consideration, however, is an attempt to communicate to the child why his response was wrong and to help him understand the processes involved, and not necessarily the child’s success in reaching this understanding. Consider the following example:

Teacher: What color of clothes should you wear when riding a bike at night?

Child: Red, or maybe white.
Teacher: Don’t you think you might want to wear white so that you could be seen better?

The teacher in this feedback reaction attempts to communicate the rationale underlying the choice of white as the appropriate color. This may or may not be understood by the child. The teacher is nevertheless credited with process feedback because of his attempt to delineate the rationale.

Differentiation among repeating the question, rephrasing the question, and asking a new question requires consideration of both the teacher’s apparent intent and the response demand of the second question. For instance, when a child is reading and stops because he apparently does not know the next word, the teacher reaction "Are you stuck?" can be seen as functionally equivalent to "Do you know the word?" and therefore codable as repeat. However, the reaction "Did you study this?" is different. Here the teacher is not merely inquiring about whether the child knows the word or wishes to make a guess. He has shifted focus to the more general matter of the child’s reading ability and faithfulness in practicing it. Consequently, this reaction is coded as a new question, since it demands a new response and is not an attempt to get the child to
produce the word. The teacher reaction "How does Johnny feel?" would be coded as a repeat with reference to question three of the examples. However, its appearance in connection with question two, when the child was stuck when trying to read the word "bad", would be coded as providing a clue (attempting to help the child guess the word by using context clues).
<table>
<thead>
<tr>
<th>Reaction Code</th>
<th>Description</th>
<th>Examples</th>
</tr>
</thead>
<tbody>
<tr>
<td>++</td>
<td>Praise</td>
<td>Teacher praises either in words (&quot;fine,&quot; &quot;good,&quot; &quot;wonderful,&quot; &quot;good thinking&quot;) or by expressing verbal affirmation in a notably warm, joyous, or excited manner.</td>
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<td>+</td>
<td>Affirm</td>
<td>Teacher simply affirms that the student’s response is correct (nods, repeats answer, says &quot;Yes,&quot; &quot;OK,&quot; etc.).</td>
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<tr>
<td>0</td>
<td>No reaction</td>
<td>Teacher makes no response whatever to student’s response — he simply goes on to something else.</td>
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<tr>
<td>-</td>
<td>Negate</td>
<td>Teacher simply indicates that the student’s response is incorrect (shakes head, says &quot;No,&quot; &quot;That’s not right,&quot; &quot;Hm-mm,&quot; etc.).</td>
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<td>--</td>
<td>Criticize</td>
<td>Teacher criticizes student, either in words (&quot;You should know better than that,&quot; &quot;That doesn’t make any sense—you better pay close attention,&quot; etc.) or by expressing verbal negation in a frustrated, angry, or disgusted manner.</td>
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<tr>
<td>GA</td>
<td>Teacher gives answer</td>
<td>Teacher provides the correct answer for the student.</td>
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<tr>
<td>AO</td>
<td>Teacher asks another student</td>
<td>Teacher redirects the question, asking a different student to try to answer it.</td>
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<tr>
<td>OC</td>
<td>Another student calls out</td>
<td>Another student calls out the correct answer and the teacher acknowledges that it is correct.</td>
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<td>Repeats</td>
<td>Repeats question</td>
<td>Teacher repeats the original question either in its entirety or with a prompt (&quot;Well?&quot; &quot;Do you know?&quot; &quot;What's the answer?&quot;).</td>
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<tr>
<td>Clue</td>
<td>Rephrase or clue</td>
<td>Teacher makes original question easier for student to answer by rephrasing it or by giving a clue.</td>
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<tr>
<td>NQ</td>
<td>New question</td>
<td>Teacher asks a new question (i.e., a question that calls for a different answer than the original question called for).</td>
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<tr>
<td>Proc</td>
<td>Processing question</td>
<td>Teacher explains why an answer was wrong or explains how to get the correct answer.</td>
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Appendix E

Class Data Sheet
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<th>GIVES</th>
<th>ASKS</th>
<th>OTHER</th>
<th>CALLS</th>
<th>REPEATS</th>
<th>CLUE</th>
<th>NEW QUES.</th>
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</table>
Appendix F

Rotated Factor Matrix
Table F-1

Rotated Factor Matrix for Loadings of the Verbal Feedback Reaction Categories on the Verbal Factors

<table>
<thead>
<tr>
<th>Feedback Categories</th>
<th>Factor 1 (Positive)</th>
<th>Factor 2 (Processing)</th>
<th>Factor 3 (Neutral)</th>
<th>Factor 4 (Negative)</th>
</tr>
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<tbody>
<tr>
<td>Processing</td>
<td>.16872</td>
<td>.75658</td>
<td>-.04342</td>
<td>.00352</td>
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<tr>
<td>Praise</td>
<td>.71744</td>
<td>.05004</td>
<td>.19306</td>
<td>.18139</td>
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<td>Positive</td>
<td>.71503</td>
<td>.08066</td>
<td>.18391</td>
<td>.16171</td>
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<td>Neutral</td>
<td>.07823</td>
<td>.18432</td>
<td>.58510</td>
<td>.11048</td>
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<td>Negative</td>
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<td>.11428</td>
<td>-.18112</td>
<td>.61522</td>
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<td>Criticism</td>
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<td>.37867</td>
<td>.40612</td>
<td>.05257</td>
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<td>Give answer</td>
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<td>.10730</td>
<td>-.43895</td>
<td>.24593</td>
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<td>Ask other</td>
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<td>-.09978</td>
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<td>.81960</td>
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<td>Repeats</td>
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<td>.77716</td>
<td>.05464</td>
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<td>Clue</td>
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<td>.01274</td>
<td>-.37341</td>
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<td>New question</td>
<td>.12800</td>
<td>-.04322</td>
<td>.60793</td>
<td>-.09855</td>
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</table>
References


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