

*The purpose of this investigation was to identify and describe the characteristics of effective teaching in the piano studio. Thirteen piano teachers were videotaped with one adult student and one child student during three consecutive lessons each. An 8- to 12-minute segment showing work on a piece in progress was excerpted from each of the 78 lessons. Computerized observation procedures, designed specifically for this and related research, were used to record and analyze teacher behavior, student behavior, and lesson progress. Ten representative excerpts were evaluated by five expert piano pedagogues, who rated the teaching effectiveness observed in each. The expert pedagogues were generally reliable in identifying ineffective teaching, but were less reliable in assessing effective teaching. Correlational analyses were used to identify the lesson characteristics associated with effective and ineffective ratings. Relatively active teachers were ranked higher than were inactive teachers. Active teachers provided more modeling and gave more feedback. Student performance episodes generally were shorter among the more active teachers, and students of the more active teachers tended to perform more successfully. The duration and pace of behavior episodes were important variables in discriminating among levels of instructional quality, with shorter episodes and, thus, faster pace associated with more effective teaching.*

**Dennis J. Siebenaler**

## Analysis of Teacher-Student Interactions in the Piano Lessons of Adults and Children

Traditions of individualized music instruction have changed little over the last few centuries (Madsen, 1988), but systematic, descriptive investigations concerning instructional effectiveness in the applied music studio are relatively rare. The content of teacher directives (Duke & Madsen, 1991), the proportion of student participation (Forsythe, 1977; Madsen & Geringer, 1983; Witt, 1986), and instructional delivery (sequence and pace) have been studied in relation to teacher effectiveness. The sequential pattern of "teacher presentation—student response—teacher feedback" has been investigated in numerous musical settings (Yarbrough & Price, 1989). Teacher feed-

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back has been studied extensively as part of instructional interactions. Factors such as specificity, contingency, credibility, and variety are related to the effectiveness of teacher feedback (Brophy, 1981). The incidence of precise feedback has been shown to increase as a result of teacher training in task-specific responses to student behavior (Bowers, 1991; Horton, 1975; Jellison & Wolfe, 1987). A brisk instructional pace has proven beneficial in maintaining student attention (Grobe & Pettibone, 1975) and may enhance achievement (Brophy & Good, 1986; Good, Grouws, & Beckerman, 1978; Preece, 1990).

An important measure of teacher effectiveness is the response of the student, but the relationship between teacher behavior and student achievement has been investigated relatively infrequently in the music setting (Duke, 1994). Higher ratings by expert judges of classroom singing performance corresponded to actual time spent singing in music class (Moore, 1981), and guitar students responded correctly more frequently when the lesson was structured in a prescribed task hierarchy (Duke & Madsen, 1991).

Few studies have examined specific behaviors of teachers and students in the applied piano studio. Kostka (1984), who recorded the frequency of verbal and performance behaviors of piano teachers and students, found that teacher behaviors combined for 63% of the total observed lesson time. Carlin (1992) compared ratings of novice teachers by expert judges to behavioral measures in the piano studio. Although there were no significant differences in the verbal and non-verbal behaviors for teachers labeled ineffective and teachers labeled effective, effective teachers changed behaviors more frequently and were more efficient in their verbalizations. Speer (1994) found a lack of specificity in teacher directives and feedback when he examined sequential patterns (teacher presentation—student response—teacher feedback) in piano lessons.

Systematic observation of student and teacher behaviors in the piano lessons of adults and children and identification of elements of effective piano teaching were the goals of the present study. A computerized observation procedure that recorded the sequence and duration of behaviors as they occurred in real time provided a unique representation of the instructional interactions in piano lessons. Interrelationships among the following factors were considered: (1) teacher behaviors, (2) student behaviors, musical progress, performance quality, and age (adult versus child), and (3) independent global evaluations of teacher effectiveness by expert pedagogues.

## METHOD

Independent piano teachers in Austin, Texas, who taught both adults and children on a regular basis were videotaped for this study. The ages of the teachers ranged from 28 to 52, and their years of teaching experience ranged from 7 to 28. Each of the 13 participating teachers was asked to select two students, one adult (age 24+) and one child (age 7–13). All students had had at least 1 year of previous piano

instruction and had studied with their current teacher for a minimum of 2 months prior to the videotaping. The participating teachers were videotaped over three consecutive weekly lessons with each student (one adult and one child).

Individual piano lessons were taped between February and May of 1991. A total of 78 lessons (13 teachers, each with 2 students, across 3 lessons) were recorded in their usual setting (e.g., elementary school music rooms, after-school community programs, home studios, and university facilities). An 8–12 minute segment during which the teacher and student worked on a “piece in progress” was selected from each taped lesson for detailed analysis. Work on a piece in progress was included in all of the recorded lessons. The piece-in-progress segment of each lesson was viewed three times: one time to focus on teacher behaviors, a second time to focus on the student, and a third time to determine the musical progress of the student performance episodes.

**Measurement. Predefined behaviors were coded** by the investigator and recorded on the Continuous Response Digital Interface (CRDI) measurement device to accurately summarize the frequency, sequence, and duration of each behavior in the lesson. Behaviors were recorded on the computer (via the CRDI) as they occurred in real time.

**Teacher behaviors.** Teacher verbal and performance behaviors were coded in the following categories:

**Clap/Sing (C/S):** The teacher sings, claps, conducts, and/or counts for demonstration purposes or in conjunction with the student.

**Play (P):** The teacher demonstrates at the keyboard or plays along with the student.

**Play/Talk (P/T):** The teacher plays and talks simultaneously (includes any type of teacher verbalization while performing at the keyboard).

**General Directive (G):** The teacher instruction is nonspecific. The directive provides no specific information regarding the manner in which the task is to be performed.

**Specific Directive (S):** The teacher instruction includes specific details regarding the task to be performed, expressive or technical. This category may include correcting notes, fingering, dynamics, and hand position.

**Questions (Q):** The teacher questions the student about some pertinent aspect of the lesson (does not include off-task questions). Questions may be specific or open-ended, with or without student response. Any teacher verbalization phrased as a question and pertinent to the content of the lesson was included in this category.

**Music Talk (MT):** The teacher talk pertains to the lesson and/or music in general but results in no immediate performance response by the student.

**Specific Approval (A):** Teacher feedback is positive and describes a specific aspect(s) of the preceding behavior.

**General Approval (a):** Teacher feedback is generally positive with no description of the preceding student behavior.

**Specific Disapproval (D):** Teacher feedback is negative and describes a specific aspect of the preceding student behavior.

**General Disapproval (d):** Teacher feedback is negative with no description of the preceding student behavior.

**Approval Mistake (AM):** Teacher approval is not appropriate to or contingent upon the preceding student behavior.

**Disapproval Mistake (DM):** Teacher disapproval is not appropriate to or contingent upon the preceding student behavior.

**Off-Task (OT):** The teacher behavior does not directly relate to music or the lesson in progress.

**Inactive (N):** No observable behavior by the teacher in any category defined above.

**Student behaviors.** Verbal and performance behaviors were coded in the following categories:

**Play/Talk (P/T):** The student plays and talks simultaneously (includes questions, singing, counting).

**Play (P):** The student performs at the keyboard.

**Clap/Sing (C/S):** The student counts, claps, or sings to the music.

**Verbal Response (R):** The student responds to the teacher's questions (correctly [+] or incorrectly [-]).

**Questions (Q):** The student questions the teacher about anything that pertains to the content or proceedings of the lesson.

**Music Talk (MT):** The student engages in some talk pertaining to the lesson or music in general not included in the other categories.

**Off-Task (OT):** The student behavior does not directly relate to the lesson.

**Inactive (N):** No observable behavior by the student in any category defined above.

**Student performance quality.** In the piano lessons analyzed, student performances (Play, Clap/Sing, Play/Talk) were rated along a continuum, from very successful (100) to very unsuccessful (0), in relation to the preceding teacher directive and the general quality of playing. Although performance quality was rated continuously, only the overall mean rating for each lesson was used in correlational analysis with other lesson variables.

**Musical progress.** Musical progress describes the relationship between each task directed by the teacher (and performed by the student) and the preceding task(s) with which it is associated. A "Forward progress" task is one that represents a closer approximation of the terminal objective than does the task that immediately precedes it. A "Backward progress" task is one that represents a more distant approximation of the terminal objective than does the task that immediately precedes it. The categories of Progress were:

**New Task:** A new student performance behavior, distinct from the previous task (student claps or counts a piece he or she just played). This category appeared most frequently as the initial performance of the piece in progress.

**Forward:** The assigned task adds a new degree of complexity (moving on to a new section, putting hands together, playing up to tempo, adding the pedal) to the preceding task.

**No Play:** No student performance response.

**Repeat:** The assigned task is a repetition of the preceding task. The repetition is intended to improve, correct, or reinforce the target skill. This category included repeated attempts to achieve the goal without changing the complexity of the task.

**Backward:** The assigned task simplifies the preceding task, breaking the task down into subskills or reducing the musical material (working hands separately, isolating technical problems, working on a smaller section of the previous performance, slowing the tempo).

**Reliability.** To assess the reliability of the behavioral definitions and observation procedures, three independent trained observers analyzed 16 (20%) of the recorded lesson excerpts randomly selected from among the 78 lessons. All categories under Progress were assessed by one reliability observer, all Student Behaviors were assessed by a second reliability observer, and all Teacher Behaviors were assessed by a third reliability observer. In addition to the three independent reliability observers, the primary observer also analyzed Teacher and Student Behaviors and Progress in the same randomly selected lessons twice, on separate occasions. The data from the reliability observations were correlated with the data from the original observations. All but one of the reliability coefficients were .90 or higher. The reliability coefficient that pertained to episode duration means of Teacher Behaviors was .78 for interobserver comparisons and .82 for intraobserver reliability. Reliability coefficients for the student performance mean score were .74 for interobserver reliability and .85 for intraobserver reliability.

**Evaluations of teacher effectiveness by expert pedagogues.** In addition to the specific behavioral measures (Teacher Behaviors, Student Behaviors, Progress, Performance Quality) used in analyzing the 78 lesson videotapes, 10 of the lesson excerpts were evaluated by five nationally known experts in the field of piano pedagogy. Ten lesson excerpts were chosen for expert evaluations because they represented different behavioral profiles.

Without knowledge of the specific criteria investigated in this study or the observation results, the experts were asked to rate the effectiveness of each lesson excerpt on a 10-point scale. Experts were asked to formulate an assessment of the quality of teaching based only on the piece-in-progress segment. In addition to a numerical rating, the judges provided a brief list of teacher strengths and weaknesses. They then ranked all 10 excerpts without ties, from most effective to least effective. An overall ranking by experts was obtained, and that score was correlated with the results of the behavioral observation. Graphic time lines were also produced; they represented the sequence and duration of teacher and student behaviors in what were rated the most effective and least effective lessons.

## RESULTS

### Summary of the Behavioral Observation

The recorded data for each lesson were summarized in each observation category according to percentage of total time for that behavior, average duration of each occurrence of that behavior, and the number of occurrences of each behavior recorded in that particular lesson segment. Because of the various lengths of excerpts, the number of occur-

rences for each behavior was divided by the total duration of the observed excerpt to determine the rate of that behavior per minute for each lesson.

Observed Teacher Behaviors for adult lessons, child lessons, and overall are summarized in Table 1. The mean percentages of all Teacher Feedback time totaled less than 5% of the lesson excerpt. The mean duration of all active Teacher Behavior episodes observed was less than 10 seconds.

The measures of Student Behaviors are summarized in Table 2. Student Play episodes were the longest of all Student Behaviors, averaging 26 seconds in duration. Inactive episodes were considerably shorter at 11 seconds. All student verbal behaviors were even shorter, lasting an average of 4 seconds or less.

Table 3 summarizes the Progress of the lessons. The mean duration of New Task episodes was longest (86 seconds), reflecting the uninterrupted initial performance of the piece in progress. Repeating the preceding task occupied the largest overall percentage of student performance time (18%).

The continuous monitoring of student performance quality on a 100-point scale was averaged over the entire excerpt. The overall performance rating was 57 (out of 100), or slightly above the midpoint. There were no differences indicated in the average performance ratings of adults and children.

### Instructional Variables and Performance Quality Ratings

One of the topics of this investigation was the relationship between the quality of student performance and pertinent instructional variables. The overall student performance rating means for each lesson were compared to other observation categories in a series of bivariate correlations.

Longer Backward episodes and the total percentage of Student Play time were associated with lower performance score means for the adult lessons ( $r = -.32$ ). Playing for extended episodes did not necessarily reflect success for the older students. Several teacher behaviors were associated with higher student performance ratings. The percentage ( $r = .39$ ) and episode duration means ( $r = .36$ ) of Teacher Play/Talk and the percentage ( $r = .39$ ) and rate ( $r = .36$ ) of Teacher Music Talk were positively correlated with overall student performance scores. The average duration of Teacher Questions for children ( $r = .35$ ) and Specific Approval for adults ( $r = .55$ ) increased as the performance ratings improved. Instructional pace as reflected in behavior rate was also related to the quality of student Playing. More frequent student-teacher interaction as reflected in the rate of Teacher Inactive episodes corresponded to higher performance scores for adults ( $r = .31$ ) and lower ratings for children ( $r = -.46$ ). This correlation may suggest a difference in pacing for adult lessons versus child lessons.

The instructional elements that were significantly related to performance quality scores were entered into a stepwise regression to deter-



Table 1  
*Teacher Behaviors: Means and Standard Deviations for Adult Lessons, Child Lessons, and Overall*

| Observation category | Percentage of excerpt |               |               | Mean duration in seconds |               |               | Rate per minute |               |               |
|----------------------|-----------------------|---------------|---------------|--------------------------|---------------|---------------|-----------------|---------------|---------------|
|                      | Adult                 | Child         | Overall       | Adult                    | Child         | Overall       | Adult           | Child         | Overall       |
|                      | <i>M (SD)</i>         | <i>M (SD)</i> | <i>M (SD)</i> | <i>M (SD)</i>            | <i>M (SD)</i> | <i>M (SD)</i> | <i>M (SD)</i>   | <i>M (SD)</i> | <i>M (SD)</i> |
| Clap/Sing            | 4 (8)                 | 5 (8)         | 4 (8)         | 5 (11)                   | 5 (11)        | 5 (11)        | 0.4 (0.5)       | 0.4 (0.5)     | 0.4 (0.5)     |
| Play                 | 3 (4)                 | 6 (8)         | 5 (6)         | 4 (3)                    | 4 (3)         | 4 (3)         | 0.5 (0.5)       | 0.6 (0.7)     | 0.5 (0.6)     |
| Play/Talk            | 8 (7)                 | 7 (8)         | 7 (8)         | 6 (5)                    | 7 (15)        | 7 (11)        | 0.6 (0.5)       | 0.5 (0.5)     | 0.6 (0.5)     |
| General Directives   | 2 (2)                 | 3 (2)         | 3 (2)         | 2 (1)                    | 2 (1)         | 2 (1)         | 0.6 (0.5)       | 0.8 (0.6)     | 0.7 (0.6)     |
| Specific Directives  | 5 (4)                 | 6 (5)         | 6 (4)         | 4 (2)                    | 4 (2)         | 4 (2)         | 0.9 (0.6)       | 0.9 (0.6)     | 0.9 (0.6)     |
| Questions            | 1 (1)                 | 3 (3)         | 2 (2)         | 2 (1)                    | 3 (1)         | 2 (1)         | 0.2 (0.2)       | 0.6 (0.5)     | 0.4 (0.4)     |
| Music Talk           | 14 (8)                | 10 (7)        | 12 (8)        | 8 (4)                    | 7 (3)         | 8 (4)         | 1 (0.6)         | 0.8 (0.5)     | 0.9 (0.5)     |
| A                    | 1 (1)                 | 1 (1)         | 1 (1)         | 3 (2)                    | 2 (2)         | 2 (2)         | 0.2 (0.2)       | 0.1 (0.1)     | 0.1 (0.2)     |
| a                    | 2 (1)                 | 2 (1)         | 2 (1)         | 2 (1)                    | 2 (1)         | 2 (1)         | 0.8 (0.4)       | 0.7 (0.5)     | 0.7 (0.5)     |
| D                    | 1 (1)                 | 1 (1)         | 1 (1)         | 2 (2)                    | 3 (3)         | 3 (2)         | 0.3 (0.2)       | 0.2 (0.2)     | 0.2 (0.2)     |
| d                    | 0.1 (0.2)             | 0.1 (0.3)     | 0.1 (0.2)     | 0.3 (1)                  | 0.3 (1)       | 0.3 (1)       | 0.0 (0.1)       | 0.0 (0.1)     | 0.0 (0.1)     |
| Off-Task             | 1 (2)                 | 1 (2)         | 1 (2)         | 2 (5)                    | 2 (5)         | 2 (5)         | 0.0 (0.1)       | 0.1 (0.2)     | 0.1 (0.1)     |
| Inactive             | 53 (14)               | 53 (15)       | 53 (14)       | 13 (9)                   | 10 (3)        | 11 (7)        | 3 (0.9)         | 3 (1)         | 3 (1)         |

*Note.* A = Specific Approval, a = General Approval, D = Specific Disapproval, d = General Disapproval. The percentages have been rounded and may not sum to 100 in each column.

mine which combination of variables would best predict performance quality. The mean duration of Student Inactive episodes ( $r = .48$ ), the mean duration of Teacher Inactive episodes ( $r = -.29$ ), the mean duration of Teacher Approvals ( $r = .26$ ), and the variability of episode durations for Forward Progress ( $r = -.22$ ) were the best combined predictors of performance ratings. Because many of the observed variables were, by nature, highly related, other factors may have been eliminated

Table 2  
*Student Behaviors: Means and Standard Deviations for Adult Lessons, Child Lessons, and Overall*

| Observation category | Percentage of excerpt |               |               | Mean duration in seconds |               |               | Rate per minute |               |               |
|----------------------|-----------------------|---------------|---------------|--------------------------|---------------|---------------|-----------------|---------------|---------------|
|                      | Adult                 | Child         | Overall       | Adult                    | Child         | Overall       | Adult           | Child         | Overall       |
|                      | <i>M (SD)</i>         | <i>M (SD)</i> | <i>M (SD)</i> | <i>M (SD)</i>            | <i>M (SD)</i> | <i>M (SD)</i> | <i>M (SD)</i>   | <i>M (SD)</i> | <i>M (SD)</i> |
| Play/Talk            | 2 (6)                 | 0.5 (2)       | 1 (4)         | 3 (6)                    | 0.9 (2)       | 2 (5)         | 0.1 (0.3)       | 0.1 (0.1)     | 0.1 (0.2)     |
| Play                 | 50 (14)               | 52 (15)       | 51 (14)       | 27 (20)                  | 25 (17)       | 26 (18)       | 1.5 (0.8)       | 1.6 (0.8)     | 1.6 (0.8)     |
| Clap/Sing            | 0.0 (0.1)             | 0.9 (4)       | 0.4 (3)       | 0.2 (0.5)                | 2 (6)         | 1 (5)         | 0.0 (0.0)       | 0.1 (0.1)     | 0.0 (0.1)     |
| Response +           | 0.1 (0.2)             | 0.6 (0.8)     | 0.4 (0.6)     | 0.5 (0.9)                | 2 (2)         | 1 (1)         | 0.0 (0.1)       | 0.2 (0.2)     | 0.1 (0.2)     |
| Response -           | 0.0 (0.0)             | 0.1 (0.4)     | 0.1 (0.3)     | 0.0 (0.2)                | 0.4 (0.8)     | 0.2 (0.6)     | 0.0 (0.0)       | 0.1 (0.1)     | 0.0 (0.1)     |
| Questions            | 1 (1)                 | 0.3 (0.6)     | 0.7 (1)       | 2 (1)                    | 1 (1)         | 2 (1)         | 0.3 (0.3)       | 0.1 (0.1)     | 0.2 (0.2)     |
| Music Talk           | 6 (4)                 | 2 (3)         | 4 (4)         | 4 (2)                    | 2 (1)         | 3 (2)         | 1 (0.4)         | 0.5 (0.4)     | 0.7 (0.5)     |
| Off-Task             | 0.5 (1)               | 1 (3)         | 1 (2)         | 1 (3)                    | 3 (7)         | 2 (5)         | 0.1 (0.2)       | 0.1 (0.2)     | 0.1 (0.2)     |
| Inactive             | 38 (13)               | 40 (14)       | 39 (14)       | 11 (5)                   | 12 (7)        | 11 (6)        | 2.3 (0.7)       | 2.3 (0.8)     | 2.3 (0.8)     |

*Note.* The percentages have been rounded and may not sum to 100 in each column.

from the regression due to their redundancy with the variables selected. The four named variables accounted for 48% of the variance in performance scores ( $R^2 = .48$ ).

### Differences in the Lessons of Adults and Children

Some differences between the lessons of adults and children were apparent in the summary of observed behaviors. All recorded behaviors for both adult lessons and child lessons were analyzed using univariate mean comparisons. The percentage of Backward Progress episodes was significantly higher in the adult lessons (see Table 3). According to the data summary, the Backward episodes were generally longer for the older students, but occurred at approximately the same rate in the lessons of the children. Teacher Music Talk (total percentage and rate) and Student Questions and Music Talk (percentage, mean duration, and rate) were generally higher in the lessons of adults (see Tables 1 and 2). The only Teacher behavior that was significantly higher in percentage of total time, mean episode duration, and rate of occurrence



Table 3  
*Progress: Means and Standard Deviations for Adult Lessons, Child Lessons, and Overall*

| Observation category | Percentage of excerpt |               |               | Mean duration in seconds |               |               | Rate per minute |               |               |
|----------------------|-----------------------|---------------|---------------|--------------------------|---------------|---------------|-----------------|---------------|---------------|
|                      | Adult                 | Child         | Overall       | Adult                    | Child         | Overall       | Adult           | Child         | Overall       |
|                      | <i>M (SD)</i>         | <i>M (SD)</i> | <i>M (SD)</i> | <i>M (SD)</i>            | <i>M (SD)</i> | <i>M (SD)</i> | <i>M (SD)</i>   | <i>M (SD)</i> | <i>M (SD)</i> |
| New Task             | 15 (14)               | 15 (10)       | 15 (12)       | 91 (96)                  | 80 (63)       | 86 (82)       | 0.1 (0.0)       | 0.2 (0.1)     | 0.1 (0.1)     |
| Forward              | 11 (8)                | 13 (13)       | 12 (11)       | 27 (31)                  | 21 (21)       | 24 (26)       | 0.3 (0.3)       | 0.4 (0.3)     | 0.4 (0.3)     |
| No Play              | 46 (16)               | 47 (15)       | 46 (15)       | 38 (39)                  | 33 (32)       | 36 (35)       | 1.2 (0.7)       | 1.3 (0.7)     | 1.2 (0.7)     |
| Repeat               | 18 (12)               | 18 (13)       | 18 (13)       | 20 (14)                  | 25 (38)       | 23 (28)       | 0.6 (0.4)       | 0.6 (0.5)     | 0.6 (0.5)     |
| Backward             | 10 (11)               | 6 (5)         | 8 (9)         | 24 (36)                  | 13 (12)       | 19 (28)       | 0.3 (0.2)       | 0.3 (0.3)     | 0.3 (0.2)     |

*Note.* The percentages have been rounded and may not sum to 100 in each column.

in the lessons of children was Teacher Questions (see Table 1),

Stepwise discriminant analysis was used to compare the lessons of adults and children. Because of the high correlations between alternate measures of the same behavior category (total percentage, episode duration means, and episode rate), each behavior measure was analyzed separately to avoid redundancy.

In each of the behavior measure discriminant analyses, the combination of variables that best discriminated between an adult lesson and a child lesson was selected. The standardized discriminant function coefficients for those behaviors that best predicted the age of the student (i.e., adult or child) were examined. When the separate analyses were compared, multiple measures of the same behavior reappeared. Student Music Talk and Questions were higher in the lessons of the adults. Teacher questions (higher for children) was a discriminating variable in all three data measurements. The percentages of Teacher Music Talk and Play/Talk (higher in the adult lessons) and the percentage of Clap/Sing (higher in the child lessons) were other contributing variables in the discriminant analyses.

### Expert Evaluations of Teacher Effectiveness

The scores and rankings for all 10 lesson segments by each of the five expert pedagogues were summarized. Two of the 10 lesson excerpts were consistently rated as least effective. There was less agreement on the most effective teaching. The reliability for all five judges across 10

Table 4  
*Relationships between Behavioral Observation Data from the 10 Ranked Lessons and Expert Rankings*

| Lesson variables         | Correlation with expert rankings |
|--------------------------|----------------------------------|
| <b>Progress</b>          |                                  |
| No Play %                | .74                              |
| Repeat SD                | -.62                             |
| <b>Teacher behaviors</b> |                                  |
| Play/Talk rate           | .70                              |
| Questions M              | .78                              |
| Inactive %               | -.90                             |
| Inactive M               | -.76                             |
| Inactive SD              | -.70                             |
| Inactive rate            | .65                              |
| Approval M               | .85                              |
| Disapproval M            | .72                              |
| Disapproval rate         | .61                              |
| <b>Student behaviors</b> |                                  |
| Play %                   | -.61                             |
| Inactive %               | .71                              |
| Inactive rate            | .63                              |
| Performance rating       | .78                              |

*Note.* All categories statistically significant,  $p < .05$

% = percentage of total lesson time for this behavior category

M = mean duration of each occurrence of this behavior in each lesson

SD = standard deviation of the mean duration of each occurrence of this behavior in each lesson

Rate = number of occurrences of this behavior divided by lesson duration

lessons, using the Kendall Coefficient of Concordance, was .57 ( $W = .57$ ). The expert judges apparently focused on different behaviors when making their evaluations as was evident in their written comments. Body language, repertoire difficulty, practice assignments, enthusiasm, teacher questions, and humor were some of the criteria mentioned.

The expert rankings for each lesson were summed to obtain an overall ranking of teacher effectiveness. The overall rankings of the ten lesson excerpts then were correlated with the behavior observation data to examine possible relationships between those variables and the independent evaluations of teacher effectiveness.

The behavior categories that were found to be related significantly to the experts' rankings of teacher effectiveness are summarized in Table 4. Student Inactivity and corresponding teacher activity were related positively to the overall rankings of the 10 excerpts. Higher

rates of teacher modeling (Play/Talk) and Disapproval also were associated with higher rankings by the experts. The average duration of Teacher Questions and Feedback (Approval and Disapproval) also related positively to expert evaluations of teacher effectiveness. As might have been expected, higher student performance scores related positively to the opinions of the five experts.

The variables that were found to be related to the experts' rankings in the bivariate correlations then were entered in a stepwise regression to determine which combination of variables would best predict the expert rankings. The percentage of Student Play, the mean duration of Teacher Approvals, the rate of Teacher Play/Talk, and the mean duration of Teacher Questions and Disapprovals accounted for 95% of the variance in expert rankings of teacher effectiveness.

In a comparison of the two lessons ranked as most effective and the two lessons ranked as least effective, the effective teachers were more active in performance (Clap/Sing, Play, Play/Talk), verbal instructions (Specific and General Directives, Questions, Music Talk), and feedback. When considering the mean durations of Teacher Behaviors, the ineffective teachers' Inactive episodes were longer. The rates of Teacher Behaviors for the effective lessons were higher than for the ineffective lessons. Students played much more and in longer episodes in the two lessons ranked least effective. The rate of student performance was higher, however, in the effective lessons.

With regard to lesson Progress, the most apparent difference between the effective and ineffective lessons was the proportion of Repeat episodes. In the lessons judged to be least effective, approximately 29% of the total lesson time was coded in the Repeat category, compared to 12% in the lessons judged to be most effective. The mean duration of Repeat episodes was also much longer in the ineffective lessons (41 seconds—ineffective, 6 seconds—effective). The ineffective lessons also contained a larger proportion and longer episodes of Forward Progress, but based on the performance ratings, the student was not necessarily more successful in attempting the Forward-moving tasks.

### Graphic Representation of Instructional Interactions in Time

The lessons that were ranked by the experts as most effective and least effective were depicted on time lines. The purpose of the chronological representation was to demonstrate the pace and sequence of Student and Teacher Behaviors throughout the excerpt and to visualize possible differences in effective and ineffective teaching. The three primary observation categories (Teacher Behaviors, Student Behaviors, and Progress) were represented on three separate time lines per system. In addition to a depiction of the timing and sequence of instructional interactions, a mean rating for each episode of student performance was notated.

In the lessons judged by experts to be least effective, long episodes of student performance were apparent over 75% of the entire excerpt,

whereas few Teacher Behaviors were evident. Six brief Directives, one Modeling episode, and one verbal Approval constituted the extent of teacher involvement over the 11-minute segment. The teacher was observed to be Inactive for 91% of the excerpt. Although extended periods of student Playing were evident, the overall performance rating of 22 indicated a lack of student success.

The time line for the lesson judged by experts to be most effective portrayed frequent and brief Student and Teacher interactions. The Progress episodes also changed frequently with comparable numbers of Forward, Backward, and Repeat. The percentage of student performance time was lower than in the ineffective lesson: 64%, with a quality rating of 66. The proportion of Teacher Inactivity was 47%. Teacher Feedback included five Specific Disapprovals and 27 Approvals. The 12-minute excerpt included 45 verbal Directives (Specific and General) encompassing 13% of the total lesson time and 37 examples of Teacher Modeling (Play, Play/Talk, Clap/Sing) encompassing 16% of the lesson excerpt. Almost all Teacher Behaviors were less than 5 seconds in duration.

## DISCUSSION

Lessons that contained a higher percentage of Inactive Student episodes, and thus a lower percentage of performance episodes, had higher student performance ratings. Although previous studies have confirmed the positive effect of student participation on attentiveness in group settings (Forsythe, 1977; Madsen & Geringer, 1983; Witt, 1986), this study suggested that the extent of participation is not directly proportional to achievement in individualized instruction. With the level of students observed (average years of lessons less than 5), a larger percentage of uninterrupted performance time often indicated a struggling student without appropriate teacher intervention.

The mean durations of Teacher Behaviors such as Play/Talk, Music Talk, and Approval were related to higher student performance scores. In addition to mean duration, rate of Teacher Behaviors was another significant factor. In this investigation, a more rapid rate of Teacher Music Talk was related to higher performance ratings. Teachers talked about the music more frequently when the playing was going well. There may have been less need for Specific Directives or corrective feedback and more opportunity for the teacher to elaborate with pertinent information (Music Talk).

The percentage, average duration, and standard deviation of episode durations for Teacher modeling (Play/Talk) episodes were positively related to student performance scores. Evidently, the effectiveness of teacher demonstration was determined to some extent by the specific demands of each instructional situation. Individual students required varying amounts of teacher modeling at different points throughout the lesson. Teacher Inactivity was negatively related to student success. In this sample of videotaped piano lessons, longer Teacher Inactive episodes coincided often with uninterrupted, strug-

gling performance episodes for the student.

The only behavior measures in this study that were significantly different between the lessons of adults and children were Teacher Questions and Music Talk, and Student Questions and Music Talk. All measures of Student Questions and Music Talk appeared as strong predictors of Adult Lessons. In general, there was more talking in the lessons of adults, possibly indicating a need to fill time or an opportunity to converse with another adult of similar interests. There was also a larger percentage of Backward Progress episodes in the Adult Lessons. The adult students may have required more remedial work on the part of the teacher. Teachers may have been more willing to correct adult students by simplifying the task and may have tried to "soften" corrections or Disapprovals for younger students by asking more Questions.

Perhaps one of the most interesting aspects of this study was the expert evaluations of selected excerpts regarding teacher effectiveness. As was expected, several of the lesson excerpts were consistently ranked as least effective; however, it is interesting to note the lack of agreement among the experts regarding which lessons were most effective. Since the overall reliability coefficient was .57, one might question what standards of excellence in the field of piano pedagogy could be universally agreed upon.

When examining the relationships between expert rankings and the numerous other instructional variables observed, it is apparent that active teachers, as reflected in behavior rates, were ranked higher. The rates of Teacher Play/Talk and Disapproval were positively associated with expert rankings of instructional effectiveness. Higher ratings coincided with more frequent modeling episodes and corrective feedback. The average durations of Teacher Questions and feedback statements (Approval and Disapproval) also were positively related to expert rankings. Feedback providing specific information, both positive and negative, was associated with higher ratings of teaching effectiveness.

A high percentage of student performance, regardless of quality, was not associated with effective teaching. Whereas previous studies in music revealed positive relationships between student participation and attentiveness, this study found that performance time was not an indicator of student success or achievement.

The time lines provided a visual picture of differences in lessons judged to be effective and ineffective. In addition to the total percentage of behaviors and the number and average duration of episodes, it is helpful to see the chronological relationships among teacher directives, student performance quality and progress, and teacher feedback. Comparing these pictures of instructional pace provided further evidence as to the active role of the teacher in the lessons judged to be effective. The frequency and duration of teacher directives and the quality and pace of student responses appeared to be important factors in experts' evaluations of teacher effectiveness.

Remaining passive or repeating an unsuccessful strategy frequently may reveal a lack of ability or initiative on the part of the instructor. In

lessons labeled ineffective, the students remained involved by playing for most of the observed excerpt, but their low performance quality and lack of success provided little musical reward. When student performance was unsuccessful, the teacher did not provide strategies to overcome difficulties.

In the lessons judged to be most effective, the student played less and the teacher participated more. The teachers who were rated as more effective provided descriptive Disapproval. Students were told specifically what needed to be corrected and were given strategies for improvement. Effective lessons contained very brief Directives, teacher modeling, and successful student performance. The instructional pace included more frequent teacher-student interaction as was evident in the time line.

In the lesson judged to be most effective, Progress shifted frequently and had the following pattern: simplifying components of the performance task, repeating the subskill for mastery, and then putting the sub-skill into context or moving on to a new aspect of the performance. The ability of the teacher to assess the problem quickly and to respond with an effective strategy contributed to a more efficient instructional pace as the ultimate task was broken down into manageable, specific directives.

This study provided an analysis of the piano lessons of adults and children. Those charged with the training and evaluation of piano teachers may find useful this information concerning instructional interactions in lessons judged by experts to be effective and ineffective. Additional research in the applied studio that examines the relationships between teacher behaviors and student success is certainly warranted.

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Submitted July 15, 1994; accepted September 20, 1995.