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AUTHOR Ridling, Zaine
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ABSTRACT

This study evaluated 90 junior high level public school teachers' interactive verbal behavior in response to three seating arrangements (row, herringbone, and u-shaped) across four dimensions: frequency of indirect teacher talk, frequency of direct teacher talk, frequency of student talk, and silence or confusion. Results indicate that: (1) teachers using either u-shaped or herringbone seating engaged in more interactive verbal behaviors than those in traditional row seating; (2) alternative seating arrangements had the most effect on the dimensions of indirect teacher talk (accepts feelings, praises or encourages, accepts or uses ideas of students, asks questions, and answers student questions) and student talk (teacher-initiated teacher talk, student questions, and student-initiated student talk); and (3) alternative seating arrangements enabled teachers to use interactive verbal behaviors in ways that made their lesson presentation more active and collaborative among students. The study concludes that other factors such as the teacher's enthusiasm, energy, and personality may be more of a factor when examining interactive verbal behavior than seating arrangement alone, and that teachers who alternate their existing row seating arrangements may effectively enhance their instructional dialectic in all dimensions. Appendixes present categories of interactive verbal behavior, diagrams of seating arrangements, and statistical data from the study. (Contains 60 references.) (JDD)

# THE EFFECTS OF THREE SEATING ARRANGEMENTS ON TEACHERS' USE OF SELECTIVE INTERACTIVE VERBAL BEHAVIORS

Paper presented at the 1994 AERA Annual Meeting, New Orleans

April 1994

by

Zaine Ridling, CEO
**RAZORBACK DATA ANALYSTS**

Kansas City, Missouri

The Effects of Three Seating Arrangements on Teachers' Use of Selective Interactive Verbal Behaviors

The purposes of this study were twofold. One objective was directed at furthering inquiry on a small segment within classroom ecology. More specifically, the study attempted to answer two questions: (1) Does seating arrangement have a significant affect upon the verbal interaction of teachers, and (2) Does seating arrangement have a significant effect upon student talk behaviors? These questions were addressed by evaluating teachers' interactive verbal behavior in response to three seating arrangements across four dimensions: (1) frequency of indirect teacher talk; (2) frequency of direct teacher talk; (3) frequency of student talk; and (4) silence or confusion.

The present study, utilizing a counterbalanced design and a more systematic and intensive method of data collection, provides evidence that interactive teacher talk behaviors can be increased and are affected by seating arrangement. Since the classrooms used in this study were different in arrangement, size, and general configuration, statements about generalizability to other classrooms can be made safely.

Desks or tables arranged in either u-shaped or herringbone configurations can facilitate interaction between the teacher and the students, and among students themselves. The results suggest that seating arrangement influences participation, thinking, and appropriate comments, which in turn can have a positive effect on learning.

The second objective was to improve on previous experimental designs regarding the examination of the effects of seating arrangement on *teacher behaviors*. Previous studies have focused primarily or student behaviors (e.g., class participation, cooperative behavior, classroom discipline, etc.) and have tended to ignore the teacher's role in the effects of seating arrangements.

Specifically, this study: (a) compares teachers' interactive verbal behaviors between three seating arrangements -- row, split-half, and u-shaped, (b) investigates the effects of seating arrangement on

teacher-student interaction in the classroom using three seating arrangements, (c) investigates whether the effects of a u-shaped seating arrangement on teacher interaction were significant over traditional row seating, (d) investigates whether the effects of split-half seating arrangement on teacher interaction were significant over traditional row seating; (e) determines the nature and proportion of teachers' verbal interaction with students in response to these three seating arrangements.

Does seating arrangement have a significant affect upon the verbal interaction of teachers and students? Substantial differences were found among certain behaviors between the three seating arrangements. Teachers using either u-shaped or split-half seating arrangements demonstrated significantly higher frequencies in all indirect teacher talk behaviors over traditional row seating. Teachers using row seating arrangements demonstrated significantly higher direct teacher talk behaviors, especially *lecturing* and *gives directions*. Because only thirty teachers constituted the sample for this study, low (but still significant) $F$ ratios were reported for most behaviors across all dimensions of interactive talk.

Oneway ANOVA served as the principal analytic procedure for this question and revealed consistent and highly significant differences between u-shaped and row seating arrangements and between split-half and row seating arrangements across all three dimensions of teacher talk. Teachers in u-shaped and split-half seating arrangements were found to make significantly more frequent use of indirect teacher talk behaviors and student talk behaviors than in row seating. Teachers in the alternative seating arrangements (u-shaped and split-half) engaged in a significantly higher frequency of indirect teacher talk behaviors, such as *asking questions* and *answering questions* than when in row seating. Further, teachers in the alternative seating arrangements lectured in significantly fewer frequencies than in row seating.

The findings of univariate analyses addressing the effects of seating arrangement on two direct teacher talk behaviors, *corrective feedback* and *criticizes students or justifies authority* are less clear.

Pearson correlation coefficients revealed significant interaction between *gives directions* and *answering questions*, but not consistently between other interactive behaviors.

The results of the analyses directed at answering the question, do student talk behaviors increase when using the alternative seating arrangements, are consistent. The level of interactive student talk does indeed tend to increase in the alternative seating arrangements. Additionally, this increase is manifested throughout all measures of student talk, be it in desks, tables, across individual subject teachers, or overall interactive behaviors.

From the results of these analyses, however, it cannot be concluded that seating arrangement is the sole source accounting for increased teacher-student verbal interaction. The subject teachers were each chosen because of their different teaching styles. Yet the teacher's enthusiasm, energy, and personality may be more of a factor when examining interactive verbal behavior than seating arrangement alone.

## METHOD

Subjects in the study consisted of 90 junior high level public school teachers in a Midwestern city of approximately 200,000 residents. Teachers were randomly selected who taught across the curriculum. The teachers who participated in the study reflected a wide range of personal and social characteristics. The majority of teachers in the sample possessed more than five years of teaching experience.

The interactive verbal behaviors of thirty junior high school level teachers were observed while their classes' seating arrangements were manipulated using a counterbalanced alternating treatments design. Hough and Ober's 13-Category modification (1966) of the Flanders System of interaction Analysis was used to measure interactive verbal behaviors.

Stratified random cluster sampling was used to ensure a moderately large sample size was obtained for the study and to reduce possible sampling error. Using school records for the 1992-93 school year to select teachers who had at least five or more years of teaching experience, a total of 252 teachers were identified as eligible for this study. Each of the thirty teachers selected randomly completed brief eight-item professional background survey following the study.

The data were collected by three trained observers using proportional tabulation sheets representing the 13 categories of teacher-to-student verbal interactions. Traditional row, herringbone, and u-shaped seating configurations constituted the independent variables. Row seating served as the control variable. Using their own classrooms, the thirty teachers were each observed during twelve different classroom sessions. Results confirmed the hypothesis that teachers using either herringbone or u-shaped seating arrangements engage in significantly more interactive verbal behaviors than those in row seating. The study was initiated during the third week of classes and involved exactly 9 observations of each teacher (3 for each seating arrangement), totaling 360 observed teaching sessions.

Baseline seating configuration was randomly selected before the study began. Each subject teacher began teaching the first two weeks of classes with traditional row. Once the study was initiated, however, each teacher was assigned a different seating configuration. Subject teacher A was assigned traditional row seating arrangement, while teachers B and C were assigned u-shaped and split-half seating arrangements respectively (see figure in Appendix B). Teachers 1, 2, 3... etc. each taught three classes each with the three seating arrangements, row, split-half, and u-shaped. Since this was a counterbalanced alternating treatments experimental design, once the baseline seating configurations were determined, the other configurations were also determined. No subject teacher knew amidst which configuration that she/he was to conduct their class until each arrived at the class that day. A model of each seating configuration is diagrammed in Appendix B.

The subject teachers' classes were conducted in a 25' X 30' classroom with chalkboards at the front and both sides of the class . One desk/table was in the center of the class. The audio recorder was placed inconspicuously in one corner of the room, behind student desks (or tables), but was not necessarily obscured from the teacher. The investigator preset the seating configuration before each class and teacher arrived for each class, prepared the recorder for taping. Taping started just before the teacher began the lesson. An investigator was present during taping but sat behind other students in the class so as not to influence any behaviors on behalf of the subject teachers nor to provide any possible added distractions within the taped teaching session. Also, this allowed the investigator to attend to any potential problems with the recording equipment.

At the end of the 16-week semester, and for the remaining time in the fall semester, the audio tapes were collected and assigned a random code. In the meantime, each tape was re-dubbed and subjected to a form of audio enhancement to improve the quality of the soundtrack due to numerous places where voices at low volumes were not adequately recorded. Reliability was controlled for by having the investigator himself score and tabulate all the data from the observations. (See Appendix B for a copy of this observation form).

## RESULTS

Teachers using either u-shaped or herringbone seating engaged in significantly more interactive verbal behaviors with students than those in traditional row seating, $F(5,354) = 12.25$, $p < .01$. Alternative seating arrangements appeared to most affect two dimensions of teacher talk: (a) indirect teacher talk, which includes *accepts feelings, praises or encourages, accepts or uses ideas of students, asks questions, and answers student questions*; and (b) student talk, including *teacher-initiated teacher talk, student questions,* and *student-initiated student talk.*

Seating arrangement appears to have a lesser, although still significant effect on the frequency with which teachers tend to lecture (*teacher-initiated teacher talk*), $F(5,354) = 4.42$, $p < .01$. However, this may be more attributable to variations in lesson content than to the diminished effects of seating arrangement. In reviewing audio taped recorded lessons and raw frequency data, it is obvious that the frequency with which teachers utilize direct talk (which includes *lecture, gives directions, corrective feedback,* and *criticizes students or justifies authority*) is heavily influenced by the lesson content being presented. For example, lessons which had little explicit factual content, but rather, required students to give their opinions about a reading or an event necessitated and allowed for frequent use of indirect teacher talk behaviors and student talk behaviors and a less frequent use of direct teacher talk. In contrast, heavily factual, informational lessons were more amenable to limited use of indirect teacher talk behaviors and student talk behaviors and a more frequent use of direct teacher talk behaviors.

However, in spite of this mitigating effect on teachers' use of indirect and student talk behaviors, teachers in the alternative seating arrangements consistently demonstrated significantly more frequent use of those respective behaviors than when their students were seated in rows. Effect size of seating arrangement was smaller than expected, .27.

Profiles of the thirty teachers indicated that those whose observed frequencies were higher in row seating tended to prefer direct teaching methods, viz., lecturing. Those in either the herringbone or u-shaped seating arrangements tended to prefer a more interactive class, among students and between themselves and their students.

Relatedly, alternative seating arrangements not only fostered more frequent use of interactive verbal behaviors, but that they also seemed to enable teachers to use the behaviors in ways that made their lesson presentation more active and collaborative among students. The observed increase in interaction across all dimensions indicates that, to an extent, seating arrangement does, indeed, influence

interactive teacher talk. Further, this finding suggests that teachers who alternate their existing row seating arrangements may effectively enhance their instructional dialectic in all dimensions.

Data were analyzed using descriptive statistics and analysis of variance. Using Cronbach's *alpha,* inter-rater reliability was measured at .93 and intra-rater reliability was measured at .98.

## DISCUSSION

The findings of this study corroborate the need for further research on classroom ecology and suggest that seating arrangement does have an impact upon teachers' interactive verbal behavior.

Most notably, this study supports the efficacy of alternative seating arrangements compared to the typical row configuration. Teachers using either u-shaped or split-half seating engaged in significantly more interactive verbal behaviors with students than those in traditional row seating. Alternative seating arrangements appeared to most affect two dimensions of teacher talk: (a) indirect teacher talk, which includes *accepts feelings, praises or encourages, accepts or uses ideas of students, asks questions, and answers student questions*; and (b) student talk, including *teacher-initiated teacher talk, student questions,* and *student-initiated student talk.*

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Teachers can be trained to increase classroom interaction within their teaching styles. This finding is both encouraging and notable. Previous attempts at examining the effects of seating arrangement have met with inconsistent, often marginal results (Sommer, 1967; Zifferblatt, 1972; Sommer, 1974; Becker, et al., 1973).

A number of possible reasons exist for the contradictory findings of previous studies and the frequent lack of effects, especially in contrast to the present study. First, much of the research is methodologically flawed. Independent variables within studies of classroom ecology often were not operationalized, and dependent variables may not be precisely defined or adequately measured. Further, relationships between independent and dependent variables are often obscured by research designs in which independent variables of vastly different types and magnitudes are manipulated simultaneously. Not only does this approach make it impossible to determine which physical factor is related to which observed behavior, but the physical manipulations may even cancel each other out, resulting in a complete lack of observable effects. Second, general classroom behavior and attitudes may be more

susceptible to environmental changes than achievement, which is presumably influenced more by factors residing within the individual. Third, when investigations are conducted in schools, the ranges of different kinds of designs and seating arrangements that are possible is usually limited. Prescott, Jones, and Kritchevsky (1967) observed striking differences in behavior across day-care centers, but substantial design differences were also apparent. In comparison, the differences among rows, seminar-shaped, and circular seating arrangements seem relatively minor. It may be that such variations are not powerful enough to affect variables such as achievement and verbal interaction unless studied first in strictly controlled environments.

Not unlike this study, Johnson (1970) attempted to determine the effect of various seating arrangements, including traditional row, crescent, and circular arrangements, on the verbal interaction of four high school classes. Observations using the Flanders Interaction Analysis (a simpler form than that of Hough and Ober's [1966]) indicated no significant differences in patterns of verbal interaction under the different conditions. However, since the Flanders instrument measures the *type* of talk (in terms of directiveness, acceptance of student ideas, etc.), it may have been unreasonable to expect seating arrangement alone to have an impact. Whereas Johnson's 1970 study suffers from inadequate internal validity; the present study suffers from a lack of external validity. The present study, utilizing a counterbalanced design and a more systematic and intensive method of data collection, provides evidence that interactive teacher talk behaviors can be increased. However, the classroom used for this study was different in arrangement, size, and general configuration, which cautions against statements about generalizability to other classrooms.

Desks or tables arranged in either u-shaped or split-half configurations can facilitate interaction between the teacher and the students, and among students themselves. The results suggest that seating arrangement influences participation, thinking, and appropriate comments, which in turn can have a positive effect on learning.

Does seating arrangement have a significant affect upon the verbal interaction of teachers and students? Substantial differences were found among certain behaviors between the three seating arrangements. Teachers using either u-shaped or herringbone seating arrangements demonstrated significantly higher frequencies in all indirect teacher talk behaviors over traditional row seating. Teachers using row seating arrangements demonstrated significantly higher direct teacher talk behaviors, especially *lecturing* and *gives directions*. Because only thirty teachers constituted the sample for this study, low (but still significant) *F* ratios were reported for most behaviors across all dimensions of interactive talk.

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Seating arrangements in either u-shaped or herringbone configurations can facilitate interaction between the teacher and the students, and among students themselves. These results suggest that seating arrangement influences participation, thinking, and appropriate comments, which in turn can have a positive effect on learning.

These data describe a classroom with discrete parameters. Assuming that the design and configuration of classrooms affect both teacher and student verbal behaviors, it is recommended that teachers investigate ecological variables in their own classrooms. Classroom assignments at the university used in this study are typically made on the basis of number of students enrolled and the availability of space. These assignments can sometimes restrict the choice of teaching method and the general conduct of the classes, and available choices remaining may conflict with instructional goals.

Well-controlled studies concerning the effects of seating arrangement. student density, familiarity with other students, classrooms of various sizes, and personality variables that influence student seating choice would increase understanding of classroom ecology.

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Appendix A Description of Categories. From J.C. Bondi (1970). Feedback from Interaction Analysis: Some Implications for the Improvement of Teaching. Journal of Teacher Education, 21(2), 190.

| Type of Talk | Category Number | Description of the Verbal Behavior |
|---|---|---|
| Indirect Teacher Talk | 1. | ***Accepts Feelings***: Accepts and clarifies the feeling tone of students in a friendly manner. Student feelings may be of a positive or negative nature. Predicting and recalling students' feelings are also included. |
| | 2. | ***Praises or Encourages***: Praises or encourages student action, behavior, recitation, comments, ideas, etc. Jokes that release tension, not at the expense of another individual, nodding head or saying "uh-huh" or "go on" are included. |
| | 3. | ***Accepts or Uses Ideas of Students***: Clarifying, building on, developing, and accepting the action, behavior, and ideas of the student. |
| | 4. | ***Asks Questions***: Asking a question about the content (subject matter) or procedure with the intent that the student should answer. |
| | 5. | ***Answers Questions (Student-Initiated Teacher Talk)***: Giving direct answers to student questions regarding content or procedures. |
| Direct Teacher Talk | 6. | ***Lectures (Teacher-Initiated Teacher Talk)***: Giving facts, information, or opinions about content or procedure. Teacher expressing their own ideas. Asking rhetorical questions (not intended to be answered). |
| | 7. | ***Gives Directions***: Directions, commands, or orders to which the student is expected to comply. |
| | 8. | ***Corrective Feedback***: Telling a student that their answer is wrong when the correctness of their answer can be established by other than opinions (i.e., empirical validation, definition, or custom). |
| | 9. | ***Criticizes Student(s) or Justifies Authority***: Statements intended to change student behavior from a nonacceptable to an acceptable pattern; yelling at someone; stating why the teacher is doing what he is doing so as to gain or maintain control; rejecting or criticizing a student's opinion or judgment. |
| Student Talk | 10. | ***Teacher-initiated Student Talk***: Talk by students in response to requests or narrow teacher questions. The teacher initiates the contact or solicits students' statements. |
| | 11. | ***Student Questions***: Student questions concerning content or procedure that are directed to the teacher. |
| | 12. | ***Student-initiated Student Talk***: Talk by students in response to broad teacher questions that require judgment or opinion. Voluntary declarative statements offered by the student but not called for by the teacher. |
| Silence | 13. | ***Silence or Confusion***: Pauses, short periods of silence, and periods of confusion in which communication cannot be understood by an observer. |

Appendix B

Copy of Observation Instrument: Proportional-tabulation sheet

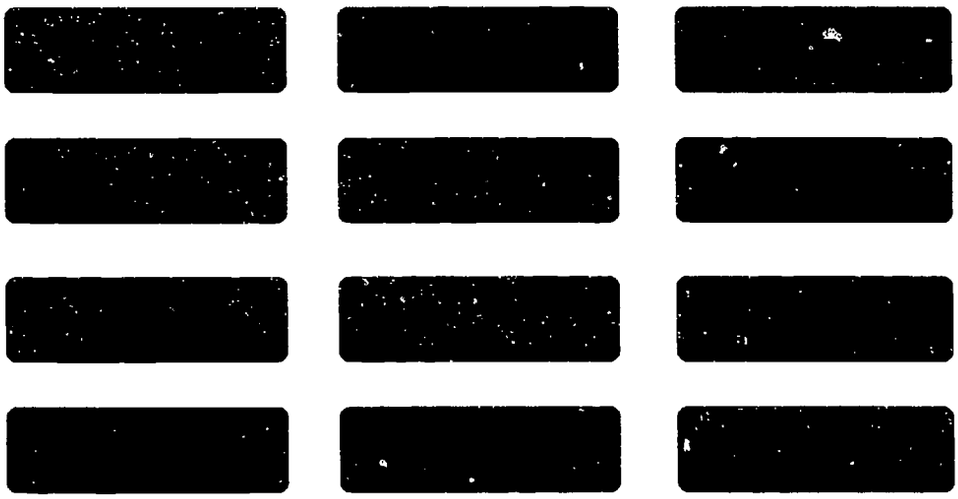
| Category | Totals | Percent |
|---|---|---|
| 1. | | |
| 2. | | |
| 3. | | |
| 4. | | |
| 5. | | |
| 6. | | |
| 7. | | |
| 8. | | |
| 9. | | |
| 10. | | |
| 11. | | |
| 12. | | |
| 13. | | |
| Total | | |

Appendix C

Diagram of Traditional Row Seating Configuration

Desks

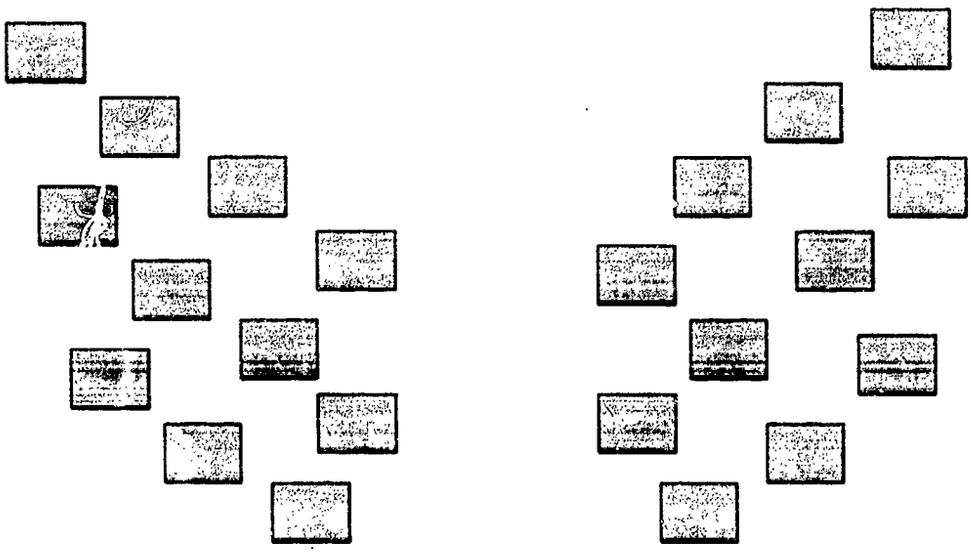
Tables



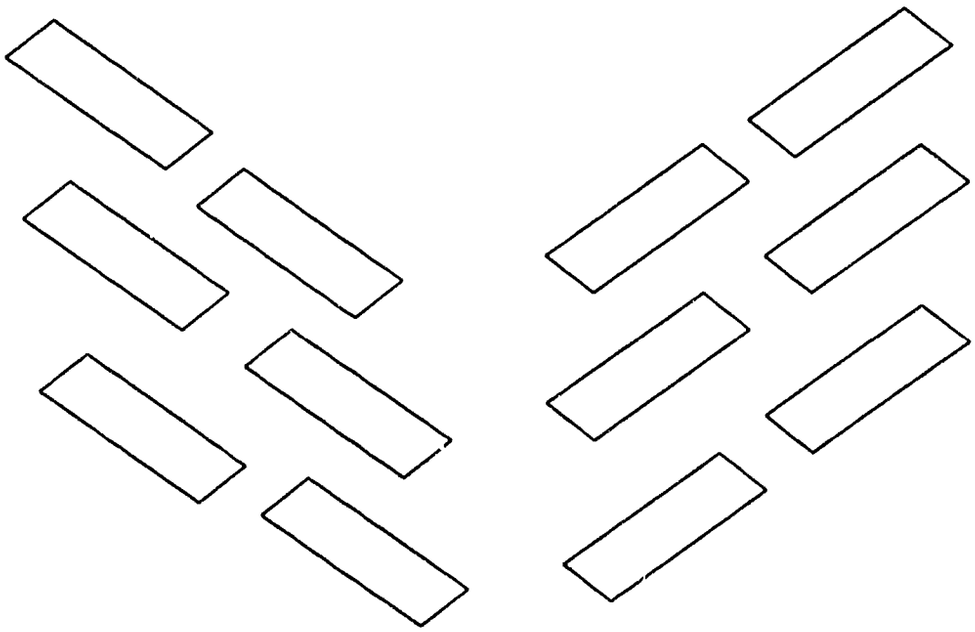
Appendix D

Diagram of Split-half Seating Configuration

Desks



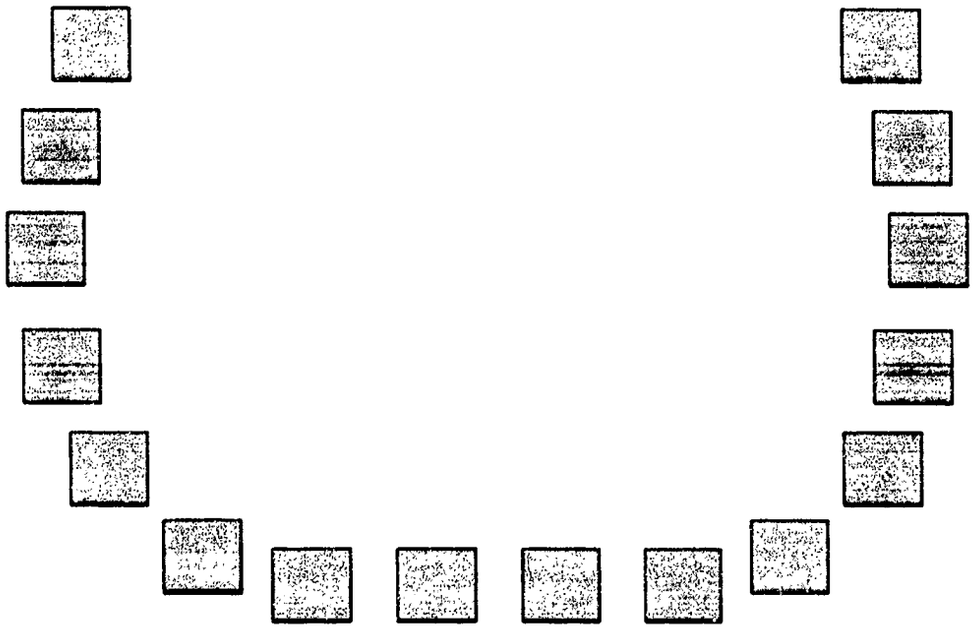
Tables



Appendix E

Diagram of U-Shaped Seating Configuration

Desks



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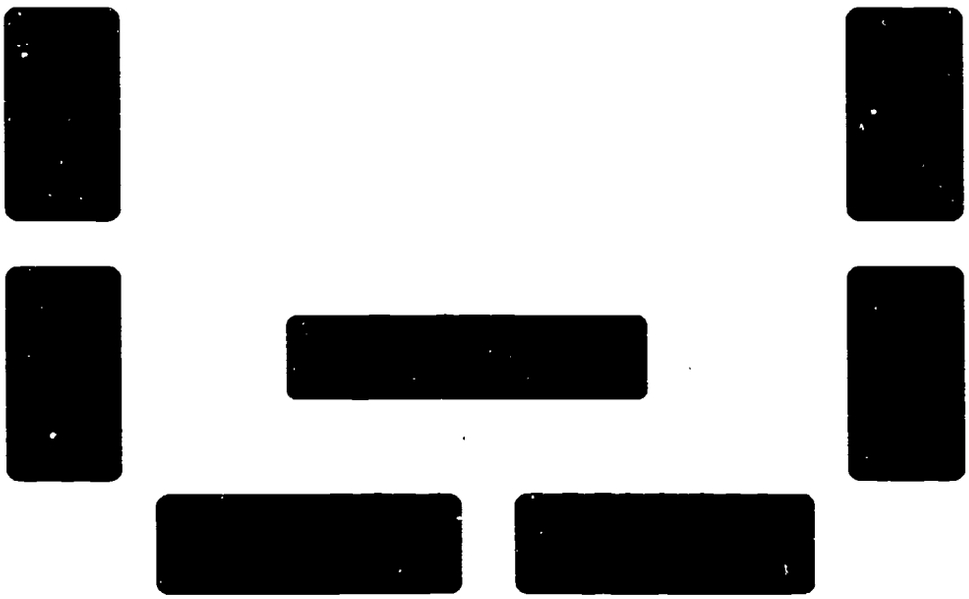
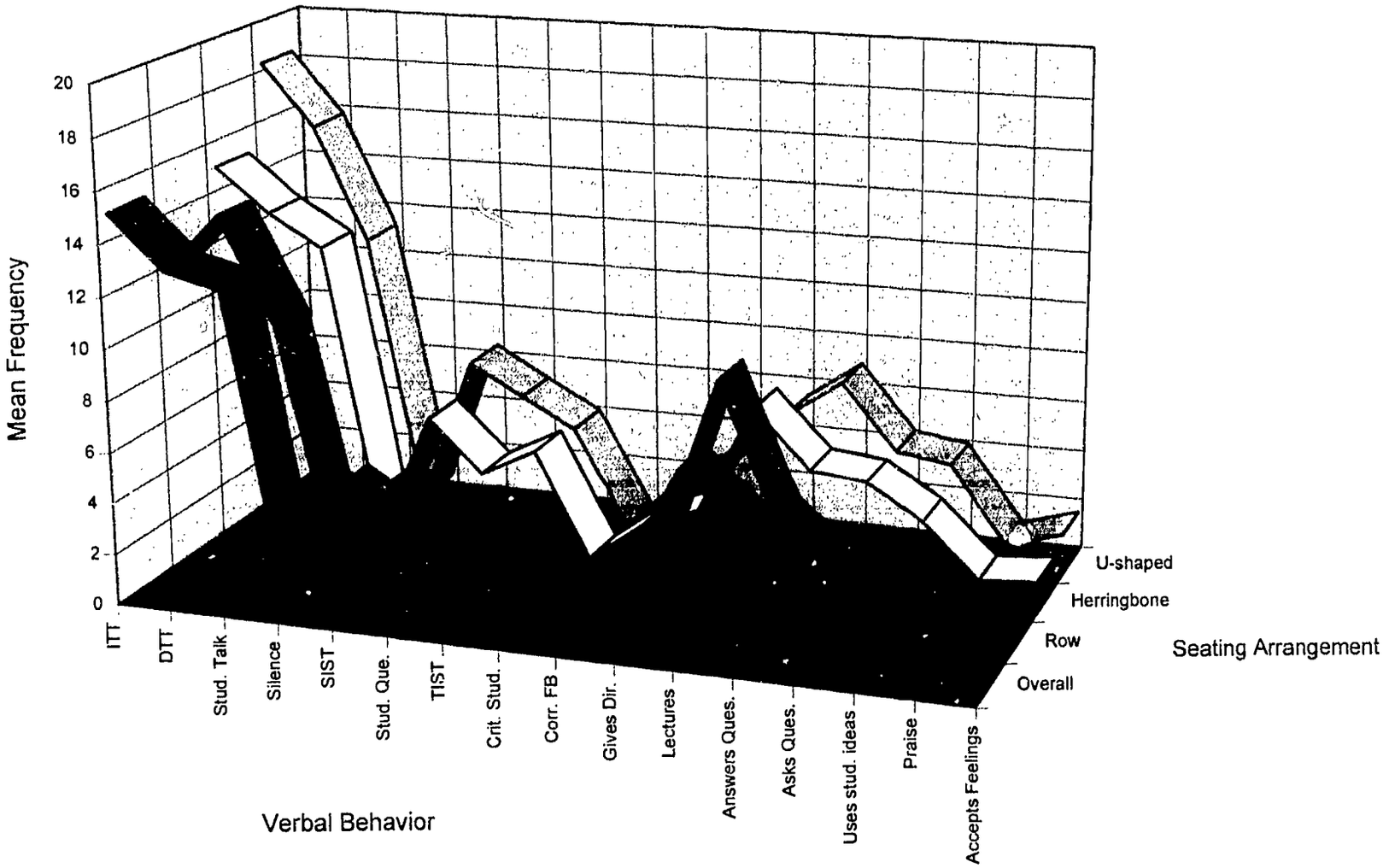


Appendix F Table 1 Analysis of Variance Summaries

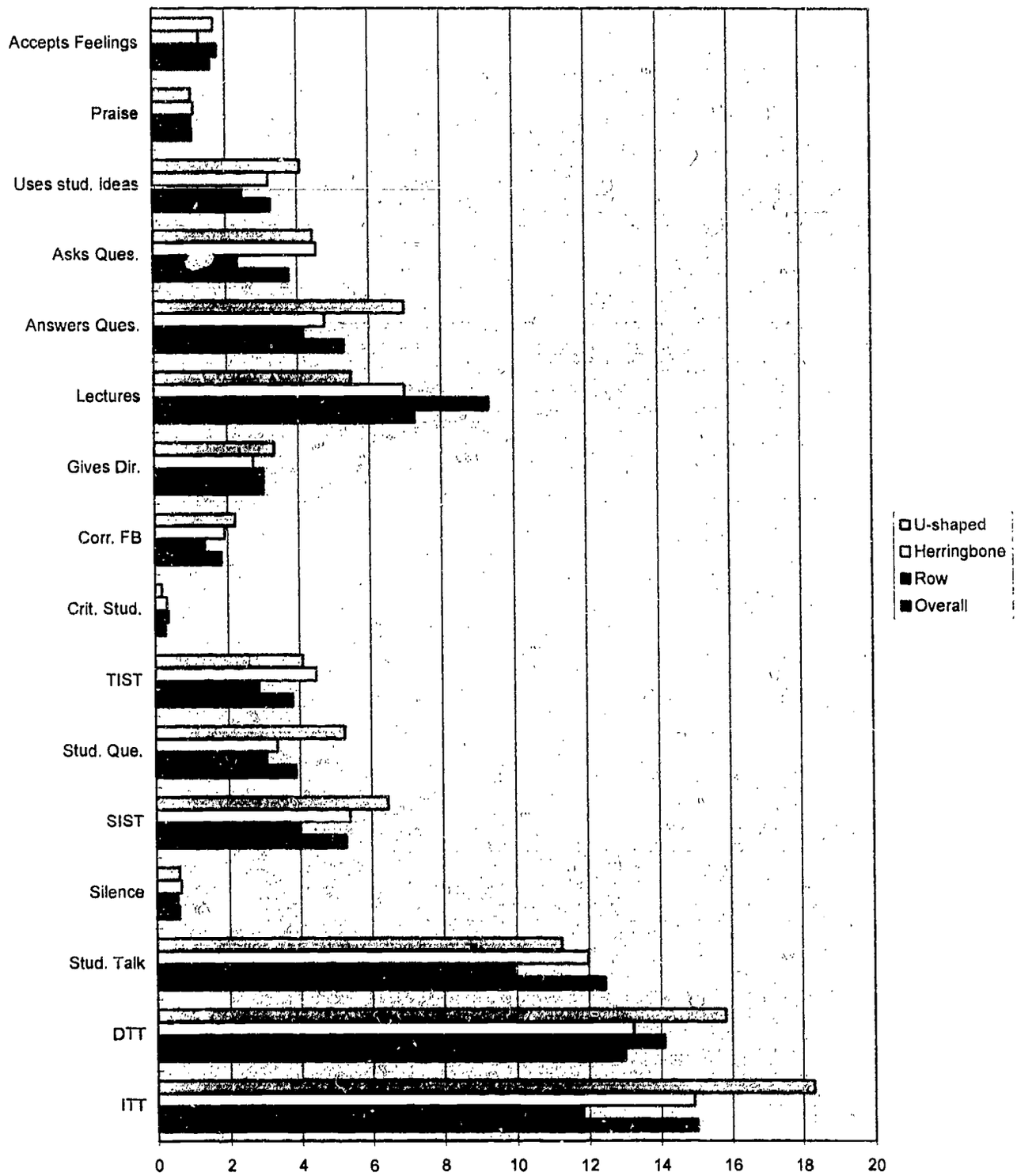
| Variable | Scale | *SS* | *df* | *MS* | *F* | Sig. of *F* |
|---|---|---|---|---|---|---|
| Indirect Teacher Talk Variables | Between Groups | 100.75 | 5 | 20.15 | 12.25 | .000 |
| | Within Groups | 582.44 | 354 | 1.64 | | |
| Direct Teacher Talk Variables | Between Groups | 527.69 | 5 | 105.54 | 4.42 | .000 |
| | Within Groups | 8441.00 | 354 | 23.85 | | |
| Student Talk Variables | Between Groups | 274.84 | 5 | 54.97 | 11.77 | .000 |
| | Within Groups | 1652.27 | 354 | 4.67 | | |
| Accepts Feelings | Between Groups | 25.60 | 5 | 5.12 | 2.50 | .03 |
| | Within Groups | 724.80 | 354 | 2.05 | | |
| Praise | Between Groups | 3.55 | 5 | 0.71 | 0.44 | .82 |
| | Within Groups | 569.60 | 354 | 1.61 | | |
| Uses Students' ideas | Between Groups | 168.76 | 5 | 33.75 | 6.08 | .000 |
| | Within Groups | 1963.73 | 354 | 5.55 | | |
| Asks questions | Between Groups | 422.27 | 5 | 84.45 | 9.04 | .000 |
| | Within Groups | 3306.13 | 354 | 9.34 | | |
| Answers questions | Between Groups | 589.15 | 5 | 117.83 | 11.54 | .000 |
| | Within Groups | 3616.00 | 354 | 10.21 | | |
| Lectures | Between Groups | 966.09 | 5 | 193.22 | 13.07 | .000 |
| | Within Groups | 5234.13 | 354 | 14.78 | | |
| Gives Directions | Between Groups | 99.06 | 5 | 19.81 | 2.70 | .02 |
| | Within Groups | 2592.53 | 354 | 7.32 | | |
| Corrective Feedback | Between Groups | 80.35 | 5 | 16.07 | 9.13 | .000 |
| | Within Groups | 622.93 | 354 | 1.76 | | |
| Criticizes Students | Between Groups | 4.13 | 5 | 0.83 | 1.93 | .08 |
| | Within Groups | 151.47 | 354 | 0.43 | | |
| Teacher-initiated Student talk | Between Groups | 176.76 | 5 | 35.35 | 3.01 | .01 |
| | Within Groups | 4158.40 | 354 | 11.75 | | |
| Student Questions | Between Groups | 510.27 | 5 | 103.05 | 13.97 | .000 |
| | Within Groups | 2586.13 | 354 | 7.31 | | |
| Student-initiated Student talk | Between Groups | 413.15 | 5 | 82.63 | 7.39 | .000 |
| | Within Groups | 3956.80 | 354 | 11.18 | | |
| Silence | Between Groups | 10.49 | 5 | 2.10 | 2.71 | .02 |
| | Within Groups | 274.13 | 354 | 0.77 | | |

# Comparative Means for Seating Arrangements




Zaine Ridling, April 1994

# Comparative Means for Seating Arrangements




Zaine Ridling, April 1994