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**Title:**
Teaching Practices and Peer Network Features in Elementary Classrooms

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## Abstract Body

**Background / Context:**

Assertions that teachers play a crucial role in classroom peer relationships are not new (Cairns & Cairns, 1994; Lewin, 1943; Gronlund, 1959), but conceptual models that specify the processes involved are more recent (Farmer et al., 2006) and empirical evidence of these processes is uncommon. Part of the difficulty in building an empirical literature linking teaching practices to classroom peer relations is the sheer diversity of teaching processes that could be studied and the equally numerous aspects of peer relationship patterns that could be impacted. Without a conceptual and measurement strategy to focus research efforts, there is a risk that claims of teacher influence on classroom social processes could become an empty truism that lacks the specificity that could guide teacher professional development efforts. In the present paper, we aim to illustrate one strategy for focusing research efforts in this area by integrating recent advances in the measurement of teacher-student interactions (Lo Paro & Pianta, 2003), conceptual models of teacher influence on social network dynamics (Farmer et al., 2006), and classroom-level measures of friendship patterns (Authors, 2007). A central premise of our approach is that teachers influence classroom social dynamics both indirectly, through general teaching practices, and more directly through active attempts to manage the social network; and that these effects can be seen not only in terms of the experiences of individual children, but also in the overall organization of classroom friendship patterns.

Lewin (1943) was certain that teachers had the opportunity and responsibility to optimize peer ecologies; and by mid-century, educational psychology texts emphasized that teachers could understand and manage peer social dynamics with the assistance of research-based technologies (e.g., Cronbach, 1954; Blair, Jones, & Simpson, 1954; Gronlund, 1959; see also Parsons, 1959). Unfortunately, the theoretical and applied ambitions of this early work did not generate a rigorous empirical literature. Limitations in scale and computational ability precluded a detailed examination of quantitative variations in classroom-level features of peer ecologies. There is great potential in a new generation of social network methodologies and statistical software packages to advance measurement and theory of classroom social environments.

In the present paper we focus on three aspects of the peer ecology: the overall richness of friendship ties among youth in the classroom, the degree to which friendship patterns suggest a relatively egalitarian vs. hierarchical social structure, and the salience norms reflected in the within-classroom correlations between peer status and particular behaviors. It has long been thought that classrooms with rich positive ties between children and many positive social relations, lead to better academic and behavioral outcomes (Bronfrenbrenner, 1979; Roseth et al., 2008). Similarly, more egalitarian or democratic peer ecologies are thought to be superior to those in which social capital is held by just a few (e.g., Lewin, Lippitt, & White, 1939). Finally, there is emerging evidence that classrooms in which peer status is positively correlated with aggressive-disruptive behavior have students who report less favorable attitudes towards school (Dijkstra, Gest, Lindenberg, & Veenstra, 2010; Henry et al., 2000).

In considering how teachers may play a role in the development of peer network structures, we distinguish between general teacher-student interaction patterns and "network-related" teaching. General teacher-student interaction patterns are presumably related to a broad range of youth outcomes, partly through their presumed impact on the peer ecology, but also through more direct processes. This approach to studying general classroom-level teaching processes is best exemplified by the Classroom Assessment Scoring System (CLASS; Pianta, La Paro & Hamre, 2006), which measures broad dimensions of Emotional Support, Instructional

Support and Classroom Organization; reflecting the view that proximal teacher-student interactions are the critical mechanisms by which classroom environments impact students (Mashburn & Pianta, 2006). A recent study by Cappella, Neal and Atkins (2008) begins to link CLASS dimensions to classroom social dynamics: in elementary classrooms rated high in Productivity, there were stronger group norms supporting academic effort and prosocial behavior. In contrast, "network-related teaching" refers to more specific features of teacher-student interaction that may have more direct relevance to the development of the classroom peer ecology, and that may be more likely to reflect conscious choices or strategies adopted by the teacher to impact the peer ecology (Farmer, 2000; Farmer et al., 2006). We focus on teachers' self-reported considerations in creating a seating chart and in organizing small groups for other instructional or social purposes. In those contexts, we distinguish between two types of considerations. First, how important is it to use seating charts or small groups to promote or reinforce friendships (i.e., Farmer's "social network management")? If successful, such efforts might be expected to increase the richness of friendship ties in the classroom. Second, how important is it to discourage potentially problematic patterns of homophily by separating students who may reinforce each other's behavior problems (Farmer's "direct management" of aggression); or by creating groups that bring together children with diverse academic skills (Farmer's "social status management")? Separating potential problem behavior youth may enhance other children's opportunities for positive peer interactions; and creating diverse-skill groups may counteract the academic-homophily that may otherwise occur as the result of instructional reading groups (Hallinan & Smith, 1989) and provide alternative routes to social status.

**Purpose / Objective / Research Question / Focus of Study:**
The long-term goal of this program of research is to clarify how teachers may influence features of peer networks that, in turn, may affect students' perceptions of social support, achievement-related beliefs and academic achievement. As a first step in this process, in this study we focus on identifying teaching practices that are associated with features of classroom peer networks. We expected that both general patterns of teacher-student interaction and more active attempts to manage the social network would be associated with the overall richness and hierarchical organization of friendship ties in elementary school classrooms. We expected that general levels of emotional support would be especially relevant in setting a positive emotional context for the development of rich friendship ties. We expected that teachers more explicit efforts to promote friendships and to reduce behavioral disruptions by separating students at risk of behavior problems would foster a setting more conducive to friendship development. We expected that teachers who sought to counteract the predominance of academic skills as a social organizer – structurally built in to most classrooms in the form of instructional reading groups – would serve to counteract strong hierarchies in the friendship network.

**Setting:**
The study included children and teachers from small- to mid-sized urban areas in central Illinois and rural areas in central Pennsylvania. In Illinois, we collected data from two school districts that serve populations of 70,000 and 35,000. In both districts, approximately 44% of students were classified as disadvantaged. The districts were quite diverse (approximately 43% African-American, 8% Asian, 3% Hispanic). In Pennsylvania, data were collected from one school

district that serves a population of 12,882, with 35% of students classified as economically disadvantaged. Students in this district were racially homogenous (>97% European-American).

**Population / Participants / Subjects:**
In the pilot year of the study (Year 1; 2008-2009), forty-one classrooms participated, providing a total of 794 students in 1st, 3rd, and 5th grade. Written consent was obtained from the 41 classroom teachers; and parental consent was obtained for 645 students. Written (3rd – and 5th – graders) or oral (1st –graders) assent was obtained from children before administering surveys. After accounting for dissenting and absent students, a total of 635 students (80% of all possible students) participated in the first or second administration of the survey ($T_{1=}$ 76%, $T_2$ = 76%). Because one classroom had extremely low participation (N = 6), its students were excluded from analysis. In the subsequent school year (Year 2; 2009-2010), a similar number of teachers and students in 1st–, 3rd–, and 5th –grade classrooms were recruited from the same schools.

**Intervention / Program / Practice:**
This study examined the typical teaching practices of elementary school teachers; as such, teachers did not follow a defined program for the purpose of the study. The general teaching practices under investigation were those outlined in the CLASS framework (Pianta, La Paro, & Hamre, 2008). The CLASS framework divides classroom quality into ten dimensions of specific interactions, which cluster in three domains: **Emotional Support**, which measures the extent to which teachers "support social and emotional functioning in the classroom" (p. 3; a composite of Positive Climate, Negative Climate, Regard for Student Perspective, and Teacher Sensitivity); **Classroom Organization**, which measures teachers' organization of instructional time and transitions, and effective use of discipline (Behavior Management, Productivity, and Instructional Learning Formats), and **Instructional Support**, which measures teachers' facilitation of students' learning using any curriculum (Concept Development, Quality of Feedback, and Language Modeling). These ten dimensions were derived from examinations of other observational measures, the literature on effective teaching practices, focus group interviews, and pilot tests (Pianta et al., 2008). Network-related teaching was measured in terms of teachers' ratings of the importance of different considerations in creating seating charts and other small-group instructional groupings.

**Research Design:**
The current project is a non-experimental, correlational study. The completed analyses presented below were based on the pilot year of the study, which included two closely spaced assessments that are combined and treated as a cross-sectional design. In Year 2, the study had a within-year longitudinal design.

**Data Collection and Analysis:** In the pilot year for which analyses are presented below, classrooms were observed early in the spring semester, and students completed surveys twice: once early in the spring semester, and again at the end of the semester. In the second year, data were collected three times: in the first 6-8 weeks of school, approximately 8 weeks later, and within 6-8 weeks of the end of the school year.

**General teaching practices** were evaluated with the Classroom Assessment Scoring System (CLASS; Pianta et al., 2008). Two observers rated each classroom for four 20-minute cycles, typically at the beginning of the day. Inter-rater reliability was high, as indicated by the intraclass correlations: Emotional Support (Intraclass Correlation = .71), Instructional Support

(ICC = .88) and Classroom Organization (ICC = .84). Scores were averaged across observers. This dual-observer system was designed to maximize the reliability of the scores used in analyses, based on research indicating that rater-variance was a critical source of measurement error for the CLASS procedure (Raudenbush, Martinez, Bloom, Zhu & Lin, 2007).

**Network-related teaching practices**. Teachers completed surveys in which they rated the importance of each of several considerations when they arranged students into groups. They were asked, "Do you have a classroom seating chart?" If so, they were asked "Please rate how important each of the following considerations was when you formed the seating chart". Each consideration was rated on a 5-point Likert scale with response options ranging from "Not at all important" (= 1) to "Somewhat important" (= 3) and "Very important" (= 5). Two of the considerations emphasized the discouragement of behavioral homophily in groups: "To place students together who have diverse skill levels" and "to separate students who might pose behavior problems if they were in the same group". Two other considerations emphasized the importance of fostering friendships: "to place children together with others who are not yet their friends (e.g., to promote new friendships and social connections)", and "To place children together who are already friends (e.g., to respect student preferences and/or reinforce those friendships)". Teachers were then asked, "Do you ever divide your students into small groups for other [non-reading-group] instructional or social purposes?" If they responded affirmatively, they rated the importance of the same set of four considerations described above. The importance of each consideration was reliably correlated across situations (seating chart; other groups), so we averaged teachers' ratings for each consideration to arrive at one score each for promoting groups with diverse skills (r = .35), separating potential behavior problems (r = .44), reinforcing friendships (r = .66) and encouraging new friendships (r = .51).

**Tight-knittedness**. Classroom peer network tight-knittedness was operationalized in terms of patterns of positive sentiments reflected in peer nominations for friendship, liking most, helping others and cooperating. The density and reciprocity of these positive sentiments (adjusting for number of nominators) formed internally consistent and stable scales (density $\alpha$=.95; reciprocity $\alpha$=.91).

**Hierarchy**. Classroom-level status hierarchy was conceptualized as the even versus uneven distribution of status and was quantified by calculating a centralization index (Wasserman & Faust, 1994) for each peer-nomination that could be interpreted as an indicator of status (i.e., nominations received for friendship, liked most, liked least, popular, cool). For each of these peer-nomination items, the centralization index summarizes the degree to which the number of nominations received by individuals in a classroom were evenly distributed (suggesting an egalitarian structure) or unevenly distributed (suggesting a prominent status hierarchy). The index is scaled so that it reaches a minimum of zero when all individuals receive the same number of nominations, and a maximum of one when a single individual receives all of the nominations. Because friendship networks in elementary classrooms tend to be highly gender-segregated, we computed centralization separately for girls and boys. Centralization indices for the status-oriented peer items were moderately intercorrelated and so were used to form a single composite indicator of hierarchy ($\alpha$=.71); this composite was moderately stable ($r$=.46) and so was averaged across the two waves.

**Salience norms**. Salience norms were conceptualized as the positive or negative peer sanctions for particular behaviors. They were operationalized as the within-classroom correlations between nominations received for peer-nominated indicators of status (friendship, like most, popular, cool) and nominations received for specific behaviors (academic skills,

aggression, prosocial behavior). The different peer-nominated status items displayed highly similar correlations with peer-nominated academic skills (α=.83) and so were combined into a single index of salience norms for academic skills; this index was highly stable over time (r=.73) and so was combined across time to form single score. Similar levels of internal consistency and stability were observed for salience norms for aggression (α=.86, r = .78) and for prosocial behavior (α=.81, r = .70).

**Findings / Results:**

Because our focus is on the association between two sets of classroom-level variables (teaching practices and features of peer networks), analyses were simply unnested linear regression models. Preliminary analyses focused on identifying appropriate control variables to maximize the interpretability of any associations between teaching practices and measures of the peer ecology. Rates of density and reciprocity were lower in larger classrooms and in 1st grade; therefore, to create measures of the peer ecology that were not confounded by these effects we regressed each measure of the peer ecology on these control variables and saved the unstandardized residual scores for use in analyses.

Preliminary findings indicate a reliable positive correlation between levels of Emotional Support rated by observers and the proportion of classroom friendship ties that were reciprocated, $r = .37$, $p < .05$. There was a trend for classrooms with higher levels of observed Instructional Support to have less pronounced status hierarchies among boys, $r = -.27$, $p < .10$. In classrooms in which teachers emphasized the importance of separating students who may pose potential behavior problems, friendship networks were more dense, $r = .43$, $p < .01$, and girls' status hierarchies were also less pronounced, $r = -.47$, $p < .01$. Girls' status hierarchies were also less pronounced in classrooms where teachers emphasized the importance of creating seating charts or groups that brought together children with diverse academic skills, $r = -.46$, $p < .01$. Finally, contrary to expectations, teachers who reported making efforts to reinforce existing friendships or foster new ones through seating charts or small-group assignments had classroom peer networks that whose salience norms were more strongly supportive of aggression ($r = .54$, $p < .01$).

**Conclusions:**

This study provides a simple but direct test of several long-standing propositions about teachers' influence on the classroom social environment. A unique strength of this study is the use of classroom-level measures teaching processes and the organization of classroom friendship patterns, but there are also several important limitations including the cross-sectional design and relatively small n of 39 classrooms. Final analyses will include longitudinal associations in an additional sample of 42 classrooms, which will permit replication of key findings and cross-lag correlations that could clarify directions of effect. What is clear from the present results, though, is that there are some reliable associations between teaching practices and peer network features, but not always in the expected direction. This suggests it will be important to accumulate additional data from a larger number of classrooms to clarify which long-standing views are actually supported by empirical evidence

## Appendices

## Appendix A. References


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**Appendix B. Tables and Figures**
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Table 1
Descriptive Statistics for Measures of Classroom Quality and Relational Support (Year 1)

| | N | M | SD | Min | Max |
|---|---|---|---|---|---|
| Peer-Nominated Child Characteristics* | | | | | |
| Aggressive Behavior | 628 | 0.18 | 0.19 | 0 | 0.93 |
| Peer Preference | 628 | 0.03 | 0.29 | -1 | 0.77 |
| | | | | | |
| Observed Classroom Quality | | | | | |
| Emotional Support | 40 | 5.34 | .51 | 4.38 | 6.50 |
| Instructional Support | 40 | 3.81 | .81 | 1.71 | 5.71 |
| Classroom Organization | 40 | 5.12 | .55 | 3.71 | 6.04 |
| | | | | | |
| Youth Reports of Relational Support | | | | | |
| Teacher Supportiveness | 628 | 4.27 | .78 | 1 | 5 |
| Classroom Supportiveness | 628 | 3.66 | 0.86 | 1 | 5 |
| Loneliness | 628 | 2.08 | 1.07 | 1 | 5 |

Table 2
Multi-level models predicting youth reports of relational support from observed classroom quality

| | Youth Reports of Relational Support | | | | | |
|---|---|---|---|---|---|---|
| | Teacher Support | | Classroom Support | | Loneliness | |
| Class Size | -0.93 | (0.92) | -0.02 | (0.02) | 0.01 | (0.01) |
| Grade | -3.52** | (1.03) | -0.14*** | (0.02) | -0.02 | (0.01) |
| Gender | 13.09*** | (3.35) | -0.02 | (0.07) | 0.01 | (0.03) |
| Peer Preference | -3.17 | (6.55) | 0.14 | (0.13) | -0.30*** | (0.07) |
| Aggression | -50.77*** | (10.27) | 0.16 | (0.20) | -0.12 | (0.11) |
| Emotional Support (ES) | 15.82** | (5.46) | 0.24* | (0.09) | -0.08 | (.05) |
| Aggression * ES | 0.47** | (0.16) | | | | |

*Note*. Models control for nesting within classrooms (n = 40) and fixed effects of school (n = 7). Class size, peer preference, aggression, and emotional support scores were centered at the grand mean. Parallel models were tested for the CLASS dimensions of Instructional Support and Classroom Organization.
* p < .05, ** $p < .01$, *** $p < .001$