Abstract Title Page
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Title: Learning in Linguistically Diverse Middle School Classrooms: The Role of the Classroom Peer Network

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Abstract Body
Limit 4 pages single-spaced.

Background / Context:
Description of prior research and its intellectual context.

The demographics in US schools are changing. More and more students are arriving in schools speaking languages other than or in addition to English at home. They have varied proficiencies in English, ranging from knowing almost no English to scoring as "fluent" in English. Current policies in K-12 schools dictate that these "English language learners" ("ELLs") are included in state assessments with only very minimal "grace periods", if any, for beginners when they first arrive. This means that students are being assessed on academic content in a language in which they are not yet proficient. Thus, it is not surprising that ELLs do not tend to score highly on these assessments. Yet their inclusion in accountability systems makes the need for effective classroom practices that simultaneously develops their language proficiency – and the academic content knowledge of both ELLs and their fluent English-speaking ("non-ELL") peers – absolutely urgent for teachers, administrators, and students.

A growing body of literature highlights the importance of the classroom peer network in shaping outcomes for all students (e.g., Gest & Rodkin, 2011). For instance, more cohesive classroom networks – i.e., those with many positive connections among classmates – have long been thought to promote better academic outcomes (e.g., Felner et al., 2001; Roseth et al., 2008). As Gronlund (1959, p. 234) stated, "the security arising from mutual acceptance in a [cohesive] group frees the group members from emotional conflicts and enables them to direct their energies towards the group task". In the present study, we are particularly interested in the degree of mutual acceptance between ELL students and their non-ELL peers in the classroom. Specifically, do classroom social networks that are more *integrated* across ELL status (i.e., with a high density of cross-group connections between ELL and non-ELL students) promote better classroom functioning and learning among all students? Integration across diverse groups in the classroom network can promote broader classroom norms of social integration, cooperation, and academic success, reduce prejudice and discrimination, and enhance immigrant youths' access to social and educational resources (e.g., Goza & Ryabov, 2009; Hallinan & Williams, 1990; Tezanos-Pinto et al., 2010).

For early adolescents especially, peer relationships are known to play an influential role in academic functioning and learning (e.g., Molloy, Gest, & Rulison 2011). Individual students' "centrality" or connectedness to peers in the classroom can be an important reflection of their overall inclusion and engagement in the classroom as well as their "access to" academic and social support and resources (e.g., Connell & Wellborn, 1991; Howe, 2010; Wentzel & Asher, 1995). Such connections may be especially important for ELL students: peer interaction can serve as an important bridge to oral language proficiency for ELLs, and interactions with peers are a critical resource through which ELL students gain exposure to how English is used in the context of US education (e.g., Carhill-Poza, 2011; Farnsworth, 2012).

Purpose / Objective / Research Question / Focus of Study:
Description of the focus of the research.

In sum, the literature suggests there is much to be gained from exploring the role of the peer network in linguistically diverse "mainstream" middle school classrooms (i.e., classrooms that include English language learners alongside fluent English-speakers). The present study uses social network analysis to examine whether between-classroom and between-student variation in

cross-language-status integration in the classroom peer network may contribute to between-classroom and between-student differences in learning. Data from a larger mixed-methods study at a linguistically diverse middle school in the southeastern United States are analyzed to test two hypotheses:

1) *Classrooms* with more linguistically integrated peer networks (i.e., those in which the network of friendships in the classroom is *less* segregated by ELL status) will show greater growth in classroom mean standardized test scores across the school year.

2) *ELL students* that are better integrated in the classroom network (i.e., having a larger proportion of friendships with non-ELL classmates) will show greater growth in standardized test scores across the school year.

Setting:
Description of the research location.

Longitudinal data were collected from 24 "mainstream" middle school classrooms (fourteen 6th grade, five 7th grade classrooms, and five 8th grade classrooms) across two middle schools in the southeastern United States. Data were collected from two cohorts of students at the beginning and end of the school year, during the 2013-2014 and 2014-2015 academic years.

Population / Participants / Subjects:
Description of the participants in the study: who, how many, key features, or characteristics.

Data were collected from 304 students (50% female), of which 82 were classified by their school district as "English language learners". The sample is racially/ethnically diverse: 37% identified themselves as White, 21% Hispanic, 17% African American, 12% as of mixed race/ethnicity, 5% Asian American or Pacific Islander, and 8% other.

Significance / Novelty of study:
Description of what is missing in previous work and the contribution the study makes.

The present study builds upon and extends past research suggesting the importance of peer interactions for language acquisition (e.g., Carhill-Poza, 2011; Farnsworth, 2012), and the importance of peer connections and integration across diverse groups for promoting better learning outcomes for all students (e.g., Connell & Wellborn, 1991; Goza & Ryabov, 2009; Roseth et al., 2008). It will be the first to use social network analysis—an as-yet underutilized methodology in ELL-focused classroom research—to measure and quantify cross-language-status integration in the classroom peer networks of linguistically diverse middle school classrooms. The resulting social network indicators of network-level and student-level integration will allow us to precisely test how these different levels of integration may contribute to student learning.

Statistical, Measurement, or Econometric Model:
Description of the proposed new methods or novel applications of existing methods.

Social network survey items (adapted from Gest, Domitrovich, & Welsh, 2005) prompted students to identify classmates whom they consider close friends. The resulting friendship "nominations" were then used to compute network-level and student-level indices of integration. Specifically, *classroom network-level integration* was operationalized using the Freeman Segregation Index (Freeman, 1972), which compares the number of observed cross-group ties in the network (i.e., ties between ELL and non-ELL students) to the number that would be randomly expected by chance, if ELL status had no bearing on friendship nominations.

Individual student-level integration was operationalized for each ELL student as the proportion of friendship nominations they made that were to non-ELL peers. In other words, we computed each student's total outdegree centrality (i.e., number of friendship nominations made; Freeman, 1979), as well as his or her *cross-group* centrality (i.e., for ELLs, the number of nominations made to non-ELLs). We then created proportion scores representing individual-level integration by dividing ELLs' cross-group outdegree centrality by their total outdegree centrality in the classroom network.

Usefulness / Applicability of Method:
Demonstration of the usefulness of the proposed methods using hypothetical or real data.

This network analytic approach to quantifying cross-language-status integration in middle school classrooms was applied in the study that is described in detail below. Findings suggest that this approach to measuring integration serves as a valuable lens into the experiences of ELL students in "mainstream" classroom peer networks, and a useful indicator of their social experiences that have implications for student learning in these classrooms.

Research Design:
Description of the research design.

Online demographic and social network surveys were administered to two cohorts of 6th, 7th, and 8th grade students during their Math or English Language Arts class in the Fall (October) of the academic year. In addition, participating students' standardized test scores from the current and previous year were collected from the school district at the end of the school year.

Data Collection and Analysis:
Description of the methods for collecting and analyzing data.

Standardized test score data collected from the district included students' scores on annual statewide content assessments from the Spring of the study year and previous year, which were used to measure across-year change to represent student learning. For ELLs, we also collected scores on a standardized assessment of language proficiency (used in a consortium of states across the country). Demographic data included self-reports of gender, race/ethnicity, and home language. Friendship nominations resulting from the social network survey were used to compute network-level and individual-level indices of integration, as described above. These scores were then entered as predictors in two models predicting student learning. First, a linear regression model was tested predicting across-year changes in classroom mean standardized test scores from classroom network-level segregation scores. Second, individual-level proportion scores were entered as predictors in multilevel models (students nested within classrooms) predicting across-year changes in standardized test scores, controlling for ELL status, demographics, and language proficiency scores.

Findings / Results:
Description of the main findings with specific details.

Data cleaning and analysis are still in progress. Thus, the results discussed here are preliminary; more formal tests of our hypotheses will be completed in the Fall of 2015. However, preliminary analyses of the data support our hypotheses about the importance of considering peer network integration in relation to academic outcomes within linguistically diverse classrooms. First, descriptive analysis of the social network data highlights the variability across classrooms in the degree of integration versus segregation by ELL status. For instance, as

is demonstrated visually in Figure 1, the friendship network in classroom B was more integrated across ELL status than was the friendship network in classroom A (classroom A segregation index = .60; classroom B segregation index = 0). In other words, same-language-status friendships (i.e., ELLs nominating other ELLs, and non-ELLs nominating other non-ELLs) were about 60% more common than would be expected by chance in classroom A, whereas they were no more likely than would be expected by chance in classroom B (please insert Figure 1 here).

In addition, our preliminary models predicting academic outcomes suggest meaningful implications of both between-classroom and between-student variation in these network indices of integration. First, we tested a regression model predicting across-year changes in classroom mean standardized test from classroom friendship network segregation, controlling for number of ELLs in the class (please insert Table 1 here). Classrooms with friendship networks that were relatively less segregated by ELL status (i.e., more integrated) showed significantly greater classroom mean gains in standardized test scores (β = -.48, p < .05). In addition, a multi-level model (with students nested within classrooms) predicting across-year changes in ELL students' standardized test scores from their individual-level integration in the class provides further support for our hypotheses. ELL students who were personally more linguistically integrated in the classroom friendship network (i.e., with a larger *proportion* of their close friends in class being fluent English-speakers) showed greater gains in standardized test scores (B = 55.37, $p <$ .01), even after controlling for their language proficiency scores at the start of the school year (B = 1.56, $p < .05$) (please insert Table 2 here).

Additional analyses to be completed in Fall 2015 will explore additional control variables, such as classroom features (e.g., class size) and teacher characteristics (e.g., years of teaching experience).

Conclusions:
Description of conclusions, recommendations, and limitations based on findings.

The classrooms examined in the present study offer an ideal opportunity to explore how the increasing diversity of classrooms can inform our understanding of secondary education to be more reflective of a globalized world. As English language learners comprise an increasingly larger proportion of the secondary school population, understanding how to support their academic development is of growing importance. Consistent with sociocultural perspectives that conceptualize learning as jointly mediated by teachers and peers (Cole, 1996) and the classroom as a potential community of practice (Lave & Wenger, 1991), our preliminary findings suggest that the degree of linguistic integration within classroom peer networks matters for student learning and is an important area of investigation. Specifically, the findings reported here provide preliminary evidence that cross-group (ELL status) peer relationships in the classroom may help to facilitate student learning, for all students and for ELL students in particular. More broadly, the social network approach employed in this study provides a unique window into the classroom peer processes that help shape students' development within today's increasingly linguistically diverse classrooms. These findings also point to an important next step for future research: identifying teacher characteristics and classroom practices that help to promote these beneficial peer network dynamics in the classroom, especially for ELL students.

Appendices

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Appendix A. References

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Appendix B. Tables and Figures
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Table 1

Linear Regression Analyses predicting Across-Year Changes in Class Mean Standardized Test

Scores from Level of Segregation in the Classroom Friendship Network

	Across-Year Changes in Class Mean Standardized Test Scores
Number of ELLs in Class	.01
Close Friendship Network: Segregation Index	**-.48***

Note. Significant effects are in boldface; *p < .05.

Table 2

Multilevel Model Predicting Across-Year Changes in ELL Students' Standardized Test Scores

from Proportion Scores Representing ELLs' Individual-Level Integration in Classroom

Friendship Network

	Standardized Test Scores	
	Coef.	SE
Intercept	347.11***	9.04
Previous-Year Standardized Test Scores	0.38***	0.08
Gender	1.61	9.51
Racial/Ethnic Minority Status	20.91	11.72
Number of ELLs in Class	3.36	1.82
Language Proficiency Composite Score	1.56*	0.55
Close friends: Proportion Non-ELL	**55.37****	**15.69**

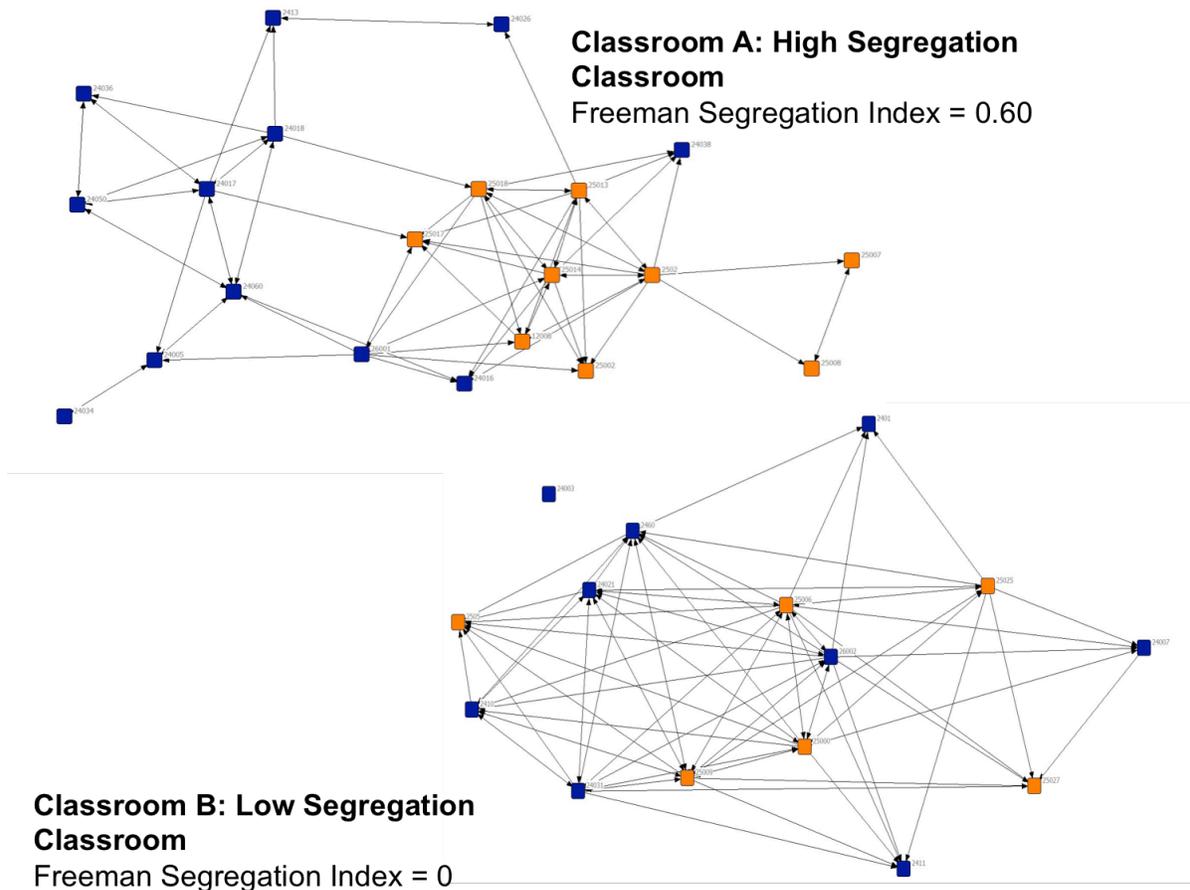*Note.* Significant effects are in boldface; ***p<.001; **p<.01; *p < .05.

Figure 1. "Maps" of the friendship networks in two sample classrooms, derived from students' friendship nominations. Orange dots or "nodes" represent ELL students, blue dots represent non-ELL students, and arrows represent friendship nominations (i.e., who nominated whom). The network in the top left represents a classroom that is highly segregated by ELL status, and the network on the bottom right represents a classroom that is highly integrated across language status.