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Female-Only Classes in a Rural Context: Self-Concept, Achievement, and Discourse

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Two middle schools in rural east Texas implemented an optional, single-sex program. Although previous studies have documented the effects of single-sex instruction, and recent educational innovations have focused on its benefits, little research has investigated its effects in rural contexts. This study found that for rural populations, patterns of discourse differ between female-only and coeducational classes, with all-female classes participating in higher levels of thinking and engaging in more discourse overall. However, girls in single-sex classes had significantly lower levels of general self-concept than girls in coeducational classes. There were no statistically significant differences in the achievement test scores between the groups. This research indicated that findings from urban contexts may not be generalizable to rural populations.

Studies have shown differences between rural, urban, and suburban contexts in educational settings (e.g., Jimerson, 2005). Specifically, the effectiveness of educational interventions can vary greatly depending on the community of learners (e.g., Bishop, 2004; Knapczyk, Rodes, Chung, & Chapman, 1999; Strange, Johnson, Showalter, & Klein, 2012), demographics (e.g., Hemphill, Vanneman, & Rahman, 2011), and cultural contexts (e.g., Qing, 2010). As rural communities search for ways to improve academic achievement and educational attainment for students, it becomes increasingly important to research

the effectiveness of interventions in rural settings. This study looks at one such trend, single-sex instruction, and the social and academic outcomes for female students in a rural school district.

A year-long quantitative study of three sixth-grade classes with seven teachers (representing four core content areas) in a rural east Texas community was conducted to determine the effects of female-only classroom grouping on reading and math achievement, discourse, and academic self-concept when compared to females in coeducational classrooms. Although some studies have documented the benefits of single-sex education in urban contexts (e.g., Sullivan, 2009; Tully & Jacobs, 2010), and the trend has been much touted by some educational reformers (e.g., Chadwell, 2010; Gewertz, 2007), little research has focused on rural contexts. It is theorized that the effects of single-gender education may change in rural contexts.

There are several reasons why the researchers anticipated differing results in a rural population. First, research has shown that rural communities tend to have higher levels of parental involvement (Provasnik, Ramani,

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Coleman, Gilbertson, Herring, & Xie, 2007). As single-gender instruction is a voluntary program, requiring parents to register their children, parental involvement is a crucial factor in the effectiveness of the intervention. Specifically, as parents in rural communities are closely tied to their school systems, their perceptions of new programs and initiatives will play a large role in the success of the endeavors. Thus, in this context of voluntary single-gender instruction in a rural community, parental support was critical to the outcome of the intervention.

In addition, researchers in the field of rural education have emphasized the importance of the specific cultural norms of each community (Flora & Flora, 2007). As each rural community represents unique values, beliefs, and demographics, the specific context of the intervention is important to the eventual outcome. Within the east Texas community that provided the context for this study, political and cultural values tended to be conservative. In the most recent general election, over two-thirds of the county voted for Republican candidates (Office of the Secretary of State, 2012), with local elections demonstrating stronger support for conservative platforms. The community has a higher affiliation with religious congregations than the national average, with the highest proportion of the population regularly attending Evangelical Protestant Christian congregations (Association of Religion Data Archives, 2010). The community's cultural norms can be classified as socially conservative, including an emphasis on family values, including traditional roles for women. These community beliefs concerning gender issues are theorized to affect the intervention through community support of the program, as well as the underlying beliefs of the participants.¹

As community members, including parents, teachers, and students, held beliefs concerning traditional roles for women. Specifically, girls who do not expect to pursue careers outside of the home may be less inclined to fully engage in school achievement and thus have lower academic self-concepts, lower levels of discourse during class, and lower levels of achievement. In addition, teachers in this context may have differing levels of expectations for boys and girls during class. These expectations may involve classroom behavior (e.g., disruptions to instruction, participation in discussions, and adherence to classroom rules) or achievement. The differing expectations may be heightened in heterogeneous groupings and lessened when the groups are separated. For example, girls in single-gender

¹ For example, in the summer prior to the intervention, a local group was vocal in opposition to homosexuality, organizing a protest along the main thoroughfares through town. Subsequently, several parents of male students expressed disinclination to participate in single-gender instruction, as it was seen, by some community members, to be in opposition to their moral and religious beliefs concerning homosexuality.

classes—that is, in the absence of their male counterparts—may receive more encouragement to participate in classroom discourse and experience an increase in both achievement and academic self-concept. However, these effects may be dampened by the overall community context that specifies adherence to traditional gender roles (e.g., that girls remain “quiet” and “well-behaved,” while “boys will be boys”).

Single-Gender Instruction

Educational reform efforts have long included propositions for single-sex instruction (Sadker, Sadker, & Klein, 1991). As late as the 1970s, these reforms focused on the differing abilities of male and female students and reinforced typical gender stereotypes concerning career and vocational aspirations (Sadker et al., 1991). As attitudes toward gender equality evolved over time, an increasing amount of concern was placed on inequities of attention paid to female students in coeducational classrooms, achievement of female students (particularly in the mathematics and sciences), and consequences to self-esteem and self-concepts of girls (Sadker et al., 1991). Single-gender instruction was then used as a mechanism to provide increased attention and specialized instruction to close achievement gaps for female students (Sadker et al., 1991). With increased interest in neuroscience, education reformers began to see single-gender education as a way to account for perceived physiological differences in the structure of male and female nervous systems (e.g., Chadwell, 2010). Although these differences have largely been disproven by the scientific community, the education community persists in defining curricular reforms based upon the claims (Halpern et al., 2011). Finally, greater concerns about urban schools and decreases in educational attainment among African American males have led to a resurgence of single-gender education in an attempt to target this subpopulation of underachieving students (e.g., Gewertz, 2007; Singh & Vaught, 1999). Recent educational reform movements among inner-city schools have sought to provide additional assistance to male students through single-gender classes and schools (e.g., Gewertz, 2007; Singh & Vaught, 1999). Over the years, efforts to reform schools through single-gender instruction have evolved to address different objectives and foci.

While interested parties who wish to have a positive effect on the academic achievement of both male and female students have enthusiastically proclaimed the benefits of single-sex instruction, the research to support such claims is mixed. A systematic review of the research conducted by the USDOE in 2005 found that only 35% of studies showed positive academic outcomes for girls in single-gender schools, while 57% of studies showed greater self-concept, and 17% of studies showed greater self-esteem (Mael,

Alonso, Gibson, Rogers, & Smith, 2005). A similar review conducted by the American Association of University Women (AAUW) in 1998 also found mixed results across studies, emphasizing the importance of context in reviewing the effects of single-gender instruction (AAUW, 1998). Both comprehensive reviews indicated that findings from urban centers and suburban communities should not be generalized to rural contexts.

Academic Achievement

There is considerable variation in the findings of studies that have investigated the effect of single-gender instruction on the academic achievement of students, and specifically female students (AAUW, 1998; Mael et al., 2005). In measures of overall achievement of female secondary students, in some studies girls in single-gender environments outperformed girls in coeducational environments (Carpenter & Hayden, 1987; Caspi, 1995; Lee & Bryck, 1986; Spielhofer, O'Donnell, Benton, Shagen, & Shagen, 2002; Woodward, Fergusson, & Horwood, 1999). However, other studies, controlling for variables such as socioeconomic status and maternal level of education, found no differences in overall measures of academic achievement (Daly, 1996; Marsh, 1989). One study, using SAT scores, actually found an advantage of coeducational programs for female students, although the effect was only consistent for White students (Garcia, 1998). Differences in context, such as private vs. public schools, demographic and background variables included in the models, and statistical analyses used may account for these differences in results (AAUW, 1998; Marsh, 1989).

Mathematics achievement. Mathematics is a subject area in which female students, especially in secondary school, tend to achieve at lower levels when compared to their male counterparts (e.g., Robinson & Lubienski, 2011). Thus, mathematical achievement has been the focus of many interventions incorporating single-gender instruction. In some studies, girls in female-only environments had higher mathematical achievement (e.g., Baker, Riordan, & Shaub, 1995; Lee & Lockhead, 1990), while in other studies there were no difference (e.g., Conway, 1996; Harker, 2000; Marsh, 1991). No difference between female-only and coeducational environments were found in the mathematics achievement among girls in Catholic secondary schools (Conway, 1996; Marsh, 1991), in schools across Ireland (Daly & Shuttleworth, 1997), across ethnic groups in public and private schools (Harker, 2000; Harker & Nash, 1997, LePore & Warren, 1997; Marsh, Smith, Marsh, & Owens, 1988), and in nationally representative samples (Lee & Bryk, 1986). Ultimately, the research has not produced a definitive conclusion as to the effect of single-gender instruction on mathematics achievement.

Language and verbal achievement. Traditionally, girls have been shown to have higher levels of achievement in verbal and reading levels (e.g. Robinson & Lubienski, 2011). Thus, most studies did not show an effect of single-gender instruction on reading scores (e.g., Harker, 2000; Lee & Marks, 1990; Marsh, 1991; Woodward et al., 1999). No effects for single-gender environments on reading achievements were found among Catholic high schools (Conway, 1996), across public and private schools (Harker, 2000; Harker & Nash, 1997; Lee & Marks, 1990; Marsh, 1991; Marsh et al., 1988), and in New Zealand (Woodward et al., 1999). However, Riordan (1985) did find that girls in Catholic schools had higher reading achievement in female-only schools when compared to coeducational schools. In addition, using a large-scale database, Lee and Bryk (1986) reported significant gains in reading scores among girls in female-only environments when compared with girls in coeducational environments and accounting for background and demographic characteristics.

Self-Concept

Another effect of single-gender classrooms that has been measured is self-concept. Self-concept is the perception of one's competency in various domains (Marsh, 1987, 1990). Self-concept has been shown to have long-term effects on student outcomes and future goals (Ahmavaara & Houston, 2007; Wilson, Siegle, McCoach, Little, & Reis, 2010). Studies have shown mixed results of single-gender classes on self-concept (Mael et al., 2005). Among private Catholic school students, there were no differences in general or academic self-concept (Lambert, 1998; Marsh, 1991). Using a nationally representative, large-scale database, Lee and Bryk (1986) also found no differences in academic self-concept. In examining self-concept, some studies have suggested that while general self-concept may be stable across groups, girls in female-only classes may define their self-concept based upon behaviors and actions, and girls in coeducational classes may define it based upon physical appearances (Granleese & Joseph, 1993).

However, some studies found gains in self-concept for girls in female-only environments (e.g., Cipriani-Sklar, 1996; Riordan, 1990). Studies have shown greater self-confidence in cognitive domains among girls in single-gender classes (Cairns, 1990) and mathematics (Mallam, 1993) and persistence in mathematics (Rowe, 1988). For example, Riordan (1990) found that White female students in female-only classes had higher self-concept than their counterparts in coeducational classes, but these differences were not present among girls of other ethnic backgrounds. In an urban context, one study found that both male and female students had higher academic self-concept when enrolled in single-gender classrooms (Belcher, Frey, & Yankeelov,

2006). In a large, representative sample of children in the United Kingdom, single-gender education reduced the gap between male and female self-concept (Sullivan, 2009). Thus, research shows mixed results of single-gender grouping on the self-concept of female students.

Discourse

As many advocates of single-gender education describe the differences between the discourse styles of male and female students (e.g., Harskamp, Ding, & Suhre, 2008), the researchers were also interested in determining if the discourse of the teacher and students was different when comparing single-gender classrooms to the coeducational classrooms. Discourse analysis has historically focused on linguistics, but more recent studies have considered student and teacher interaction. For example, Lindsay (1990) believed that analyzing discourse is an important technique for educators because it reveals the manner in which multiple forces interact to shape instruction. Nathan and Knuth (2003) reviewed how discourse has moved from teacher-centered instruction to a more student-centered focus but did not connect this phenomenon directly to student outcomes. In a study of discourse, Lam, Law, and Shum (2009) coded utterances, the smallest unit of speech with meaning, by speaker (teacher or student), type (eliciting, offering, or regulatory), and cognitive level (high or low). They found better educational outcomes were associated positively when high cognitive demand was expected and negatively when utterances were related to discipline (Lam et al., 2009). As research has shown differences between language development (e.g., Lung, Shu, Chiang, Chen, & Lin, 2009) and use (e.g., Newman, Groom, Handelman, & Pennebaker, 2008) between genders, it is theorized in this study that there may be differences in discourse between all female and coeducational groupings.

Despite the mixed findings from research reports, the movement toward single-gender classes has expanded in recent years (e.g., Gewertz, 2007; Sax, 2005), primarily in urban and suburban areas. However, it is apparent that context is an important variable when evaluating the potential effectiveness of single-gender classes (AAUW, 1995). Specifically, it is unjustified to generalize findings from urban populations, or even national databases, to rural contexts. This study, therefore, focused on the effectiveness of single-gender instruction in one rural school district in east Texas.

Rural Education

Rural communities, while facing many of the same challenges as urban communities, such as poverty and demographic changes, also face unique challenges to

education. Schools in rural contexts often face educational obstacles (e.g., Butera & Dunn, 2005; Jimerson, 2005). For example, rural communities tend to have less access to resources, such as cultural centers (e.g., museums, libraries, and performance halls), infrastructure (e.g., public transportation and high-speed Internet), and community services (e.g., hospitals and community-based social services) (Jimerson, 2005). While rural communities have higher levels of parental involvement, the parental expectations for the attainment of higher education are lower (Provasnik et al., 2007). Fewer rural students are enrolled in higher education (Provasnik et al., 2007). Students in rural communities fall behind suburban communities (but are ahead of urban areas) in academic achievement and graduation rates (Provasnik et al., 2007). Rural school districts receive less of their total income from the federal government, while their expenditures per student are greater (Provasnik et al., 2007). Rural school districts also have less access to resources, including fewer computers with Internet access per student (Provasnik et al., 2007). Teachers in rural communities earn less, even after adjusting for cost-of-living differences, and rural districts, despite the need, have greater difficulty filling English as a Second Language teaching positions (Provasnik et al., 2007). These factors emphasize the need for educational interventions to improve the academic achievement of students from rural communities. The limitations of these school systems indicate a need for cost-effective and easily implemented strategies, two characteristics often touted by proponents of single-gender instruction (Chadwell, 2010).

In addition to these tangible and measureable differences, rural communities have different cultural and community norms. These communities may be more resistant to change (Flora & Flora, 2007), which may complicate educational reform efforts. Many rural communities can be described as “tight-knit,” so successful school leaders must work carefully to include the community to garner political support for the school system and reform (Cruzeiro & Boone, 2009). Therefore, the efficacy of educational reform efforts in rural communities depends upon external factors, including community support and leadership. These barriers to change may adversely affect the benefits of educational interventions within rural contexts.

Methods

The research study began as a collaboration between university faculty and school district personnel. The district, prior to implementing a new initiative, was interested in the effects of the single-gender instruction. After initial classroom assignments were made and the school year began, the research team, comprised of university faculty, began to collect data within three sixth-grade classrooms on

two middle-school campuses. Throughout the school year, the research team conducted observations of the classrooms (both female-only and coeducational) to document patterns of discourse. Student achievement data from the state's accountability measures in reading and math were examined. At the conclusion of the school year, students in both conditions were asked to complete the Academic Self-Descriptive Questionnaire I (ASDQI; Marsh, 1990). The data were then analyzed to determine differences between groups.

Context

The school district involved in this study is situated in a rural community in east Texas, over 140 miles from the nearest urban center. The school district has diverse demographics including approximately 30% African American and 43% Hispanic students (Texas Education Agency [TEA], 2011). The district also includes a majority of students classified as economically disadvantaged (75%) and academically at-risk (62%), as well as a large proportion of English language learners (21%) (TEA, 2011). The district overall, as well as both middle schools individually, were rated as academically acceptable by the state accountability rating system (TEA, 2011), with 61% of students meeting the standards of state-mandated achievement in both math and reading (TEA, 2011).

Based upon a new initiative, the district offered the opportunity for all parents of entering sixth-grade students to enroll their children in single-gender classes. The two middle schools hosted informational meetings for parents as part of activities at the beginning of the school year. In addition, the district provided to faculty at both schools professional development related to teaching strategies for gender-differentiated instruction. However, only a small number ($n=2$) of teachers who implemented the intervention attended the training, due to the changes in staffing needs at the school. Both teachers taught language arts at their respective schools. Although research concerning gendered education has suggested that it is most effective when training occurs and teachers make modifications to their instruction (Spielhagen, 2011), separate observations by the research team showed no instructional differences between the two conditions. Thus, the intervention focused on the separation of female students in classrooms rather than on specific gender-related instructional techniques.

Throughout the implementation of the program, the district was in a state of transition. The driving force behind the initiative was a central office administrator who left the district prior to the beginning of the school year. In addition, the superintendent was in his final year of employment, and both campus principals were in their first year at their schools. Thus, there was little continuity from the planning

stages through the implementation of the project.

Among parents and community members, there was an overall low response to and interest in the program, despite additional informational meetings and written communication to parents. Thus, there were not enough male student volunteers to comprise a single class at either school. There was slightly more interest from the parents of female students, and two classes at School A and one class at School B were formed. Thus, this study analyzes the differences between all-female classes at the two middle schools and coeducational classes at the same schools, taught by the same teachers. Due to the number of female students electing for single-gender classes, there was a disproportionate number of male students in the coeducational classes at each school.

Sample

The sample of students included the female students enrolled in the female-only classes at both middle schools ($n=74$) and a comparison group of female students who were taught by the same teachers in coeducational settings ($n=98$). See Table 1 for demographic information. In the comparison classrooms, less than 40% of the students were female due to the number of female students electing to join single-gender classes. A subset of these students was included in the self-concept analyses, as the participation rate was based upon the teachers' adherence to the research protocols. The return rate was 44%, representing students from both female-only ($n=29$) and coeducational ($n=48$) classrooms. Two groups of girls in School A and one group in School B were instructed by teachers in their core classes (mathematics, science, social studies, and language arts) throughout the day. These girls attended all their core classes with the same group. Similarly, girls in the coeducational group attended core classes with the same group of coeducational students taught by the same teachers. Thus, core content teachers ($n=7$) taught both female-only and coeducational classes throughout the day.

Achievement

Data regarding the student achievement of all participating students were collected. The state used the Texas Assessment of Knowledge and Skills (TAKS) as the measure of academic competency and for accountability measures for districts, schools, and students. In validation samples, scores on this test have been demonstrated as internally consistent, reliable, and valid (TEA, 2010). Scores on the sixth-grade reading and math subtests were compared between female students in female-only classrooms and comparison groups, with scores on the fifth-grade tests used as covariates.

Table 1

Demographic Statistics

	All-Female Classes		Coeducational Classes		Total	
	<i>N</i>	Percent	<i>N</i>	Percent	<i>N</i>	Percent
Whole Sample	74	43.0	98	57.0	172	100.0
School "A"	39		66		105	61.0
School "B"	35		32		67	39.0
Self-Concept Sample	29	37.7	48	62.3	77	100.0
School "A"	11		42		55	68.8
School "B"	18		6		25	31.3

Self-Concept

Self-concept was measured by the ASDQI (Marsh, 1990), which has been widely used as a measure of self-concept in elementary-aged children. Marsh's (1990) research reported an internal consistency ranging from .881 to .941 for the scales with a sample of Australian students. For our research, scales concerning Spelling, Computer Studies, Handwriting, Religion, and Health were eliminated, as these subject areas were not specifically taught at the schools studied and would not be salient to our population.

Although all teachers were invited to have students participate in the end-of-the-year survey, only 77 students (44%) completed the ASDQI. Less than one-third of the students were from School B ($n=25$), with the remaining from School A ($n=55$). Approximately three-quarters of the students were in coeducational classes ($n=48$), while fewer participants were in female-only classes ($n=29$).

Due to concerns of the principals and superintendent of the local school district, one set of items from the ASDQI was changed. The original item read "I am hopeless when it comes to [fill in school subject area]" (Marsh, 1990), but it was reworded to say "I am hopeful when it comes to [fill

in school subject area]." This change was implemented due to repercussions anticipated by the local school district administration from the rural community. However, in subsequent reliability analyses, these items were shown to be unreliable in predicting the scale scores and were thus dropped from further analyses. The final reliability estimates for the nine factors ranged from .792 to .947 (see Table 2). Each of the subject-specific self-concepts relate to how confident the student feels about her ability in each subject area (math, physical education, language arts, science, social studies, art, and music). General self-concept measures the student's general self-esteem and confidence in her own abilities (Marsh, 1990). Academic self-concept measures a student's confidence in her abilities in school and general academic areas (Marsh, 1990).

Discourse

Two times per semester, one of the researchers coded the utterances of each teacher participating in the study during classroom instruction, including one female-only class and one coeducational class. This researcher, trained in educational theory and a professor of education, then coded

Table 2

Reliability Estimates for Self-Concept Measures

Variable	Chronbach's Alpha	Number of Items	<i>M</i>	<i>Variance</i>
Math Self-Concept	.932	5	5.6	.09
Physical Education Self-Concept	.792	5	7.1	.06
Language Arts Self-Concept	.911	5	6.1	.03
Science Self-Concept	.884	5	6.2	.02
Social Studies Self-Concept	.924	5	5.9	.01
Art Self-Concept	.929	5	5.3	.18
Music Self-Concept	.947	5	5.6	.03
General Self-Concept	.798	5	6.6	.13
Academic Self-Concept	.868	5	6.2	.02

Table 3

Comparison of Self-Concept of Girls in All-Female and Coeducational Classes

	All-Female		Coeducational		<i>t</i>	<i>df</i>	<i>p</i>	<i>e.s.</i>
	<i>n</i>	<i>M(SD)</i>	<i>n</i>	<i>M(SD)</i>				
Math Self-Concept	29	4.85 (2.0)	48	5.47 (2.0)	-1.31	75	.193	-.31
Physical Education Self-Concept	29	6.84 (1.0)	48	6.78 (1.3)	.25	75	.804	.05
Language Arts Self-Concept	29	5.28 (1.9)	48	6.04 (1.7)	-1.79	75	.078	-.42
Science Self-Concept	29	6.18 (1.2)	48	6.13 (1.5)	.15	75	.679	.04
Social Studies Self-Concept	29	5.38 (1.4)	48	6.03 (1.9)	-1.57	75	.121	-.38
Art Self-Concept	28	5.37 (2.2)	48	5.29 (2.3)	.15	72	.884	.04
Music Self-Concept	28	5.68 (2.3)	48	5.64 (2.1)	.07	75	.942	.02
General Self-Concept	28	5.94 (1.3)	48	6.42 (1.1)	-2.89*	75	.005	-.40
Academic Self-Concept	28	5.97 (1.2)	48	6.21 (1.4)	-.77	75	.441	-.18

Note. * $p < .05$

the classroom discourse. Consistency between observations was controlled by using one observer for all conditions.

Utterances were defined as the smallest unit of speech with meaning (Lam et al., 2009). Utterances were coded *T* if the teacher were speaking and *S* if the student were speaking. *F* denoted that the speaker was female, *M* if male, and *B* if the utterances were choral with both males and females speaking in unison. Next, the researcher coded an *O* if the utterance was offering a response, *E* if the utterance was eliciting a response, and *D* if the utterance was a demand. Then the researcher coded a "1" if the thinking displayed was low-level (knowledge, comprehension, application) or "2" if the thinking was high-level (analysis, synthesis, evaluation) (Bloom, 1984). Utterances coded as level 1 indicated recitation of facts, comprehension of content, and basic application of those facts to course materials. Utterances coded as level 2 included more complex interpretations, evaluation of content and sources, and application of the content in new and novel ways.

All seven female-only classes, representing each of the three classes of female students in the core subject areas of Math, Social Studies, Science, and Language Arts, were observed to analyze discourse. These observations occurred twice in the fall semester and twice in the spring. In addition, the comparison group of coeducational classes, matched classes with the same teacher and subject area, was observed, selecting a matched class with the same teacher and subject area on the same day. Each utterance observed ($n=3886$) was coded. Chi-square analyses were conducted to test for differences between each group.

Results

Self-Concept

When comparing females in female-only classes to females in coeducational classes, female-only classes had statistically significantly lower levels of general self-concept, $t(75)=-2.89, p=.005$. There were no significant differences for any other measure of self-concept (Mathematics, Language Arts, Physical Education, Science, Social Studies, Art, and Academic). These results are presented in Table 3.

Achievement

Prior to beginning the analyses to determine the effect of female-only classes on academic achievement, the research team tested to see if the groups had similar achievement scores in fifth grade. The researchers also examined the fifth-grade scores of the female students and found no significant differences in math ($t=.355, df=170$) or reading ($t=-.542, df=170$) for the two conditions (see Table 4). Therefore it was concluded that there were no differences between the two groups prior the intervention.

To analyze the effects of female-only classes on academic achievement, an analysis of covariance was conducted. After controlling for fifth-grade reading scores, there was no significant difference between students in female-only or coeducational classes in math ($F[1, 169]=0.08, p=.779$) or reading ($F[1, 169]=1.04, p=.310$; see Table 5 and 6). Thus, for female students, there were no measureable differences

Table 4

Comparison of Achievement Test (TAKS) Scores

	Female-Only	Coeducational	<i>t</i>	<i>df</i>
Fifth Grade				
Mathematics	31.54 (8.97)	32.31 (9.32)	.355	170
Reading	32.88 (6.63)	32.50 (7.14)	-.542	170
Sixth Grade				
Mathematics	32.65 (8.68)	32.51 (9.60)	.453	170
Reading	33.84 (6.84)	33.35 (7.17)	.098	170

in achievement for students in female-only or coeducational classes.

Discourse

Descriptive data revealed the total number of utterances displayed in female-only classrooms was approximately 10% higher than in coeducational classrooms (see Table 7). Teacher-talk recorded for the entire sample was 30% more than student-talk (see Table 7). Even in the coeducational classes, females spoke more than males. However, most of the discourse (52.2%) was in

offering responses to posed questions. The thinking level shown for the entire sample was 98.1% at the knowledge or comprehension level of Bloom's Taxonomy of Thinking (Bloom, 1984).

Chi-square analyses revealed that there were no significant differences in the types of utterances (i.e., elicit, offering, or demanding; $\chi^2_2=1.79$) or who was talking (i.e., teacher or student; $\chi^2_2=5.38$) for female-only and coeducational classes (see Table 8). However, there was a significant difference in thinking level when comparing the female-only to coeducational classroom discourse ($\chi^2_2=54.65$, $p<.001$). In all-female classes, more abstract/

Table 5

Comparison of Sixth-Grade Reading Achievement

	Sum of Squares	<i>df</i>	Mean Squares	<i>F</i>	<i>p</i>
Intercept	299.56	1	299.56	18.15	<.001
Fifth Grade Reading Score	5643.70	1	5643.70	342.04	<.001
Condition	1.31	1	1.31	.08	.779
Error	2788.56	169	16.50		
Total	202140.00	172			

Note. $R^2=.670$

Table 6

Comparison of Sixth-Grade Mathematics Achievement

	Sum of Squares	<i>df</i>	Mean Squares	<i>F</i>	<i>p</i>
Intercept	408.61	1	408.61	16.30	<.001
Fifth Grade Math Score	1027.53	1	1027.53	407.26	<.001
Condition	25.94	1	25.94	1.04	.310
Error	4235.82	169	25.06		
Total	196900.00	172			

Note. $R^2=.707$

Table 7

Frequencies of Discourse Types for Entire Sample

	<i>N</i>	Percentage
School		
School A	1812	46.6
School B	2074	53.4
Observation Period		
Fall Observation	1681	43.3
Spring Observation	2205	56.7
Classroom Type		
All-Female	2180	56.1
Coeducational	1706	43.9
Utterance		
Teacher	2416	62.2
Student	1469	37.8
Choral	1	<.01
Speaking		
Male	361	9.3
Female	3362	86.5
Choral	163	4.2
Response		
Eliciting	1410	36.3
Offering	2027	52.2
Demanding	449	11.6
Thinking Level		
Basic/Low	3813	98.1
Abstract/High	72	1.9

high-level thinking according to Bloom's Taxonomy was displayed. However, that only comprised 3% ($n=71$) of the total number of utterances in female-only classes.

Discussion

Specific to this study, the community context influenced the efficacy of the intervention. The transition of the upper administration of the school district, amid political controversy within the town, undermined the effective implementation of educational reform efforts. Specifically, without community support, enthusiasm from the personnel lagged.² Despite informational material distributed to parents and meetings held during open house and at other times, few parents expressed interest in volunteering their

² Personal communication with district personnel, 2011.

children for the program. In particular, parents of male students were reluctant to opt for single-gender instruction. Indeed, with such minimal support, neither school was able to form an all-male class. These parental attitudes might be due to values that are idiosyncratic to the particular school district involved.

This study showed three findings about the effect of all-female classes in a rural school district. First, in the female-only classes, high levels of thinking were observed in the discourse significantly more often than in coeducational classes. Secondly, female students in the female-only classes showed significantly lower levels of general self-concept, when compared with female students in coeducational classes. Finally, there were no differences in math and reading achievement for female students in female-only and coeducational classes. Overall, these findings do not support

Table 8

Chi-Square Analyses of Discourse by Classroom Type

Utterance Category	Classroom Type		χ^2	df
	All-Female	Coeducational		
Teacher	1340	1076	1.79	2
Student	839	630		
Speaking			518.79**	2
Male	0	361		
Female	2099	1263		
Choral	81	82		
Response Type			5.39	2
Eliciting	764	646		
Offering	1173	854		
Demanding	243	206		
Thinking Level			54.65**	2
Basic/Low	2108	1705		
Abstract/High	71	1		

Note. ** indicates $p < .01$

the continued implementation of single-gender classes in this rural school district.

Academic Achievement

The achievement findings parallel the showing no effect of single-gender instruction on the academic achievement of students (e.g., Conway, 1996; Marsh, 1989). However, they do contradict other studies that found some effects (e.g., Carpenter & Hayden, 1987; Caspi, 1995). The lack of an effect on academic achievement may be due to the lack of robust community and parental support for the voluntary program, leading to ineffective implementation of gender-based instructional strategies and low enrollment in the program. In addition, this intervention was only implemented over the course of one academic year, which may not be sufficient time to show an effect. Another explanation for the lack of improved academic achievement may have been the small number of teachers trained in modifying instruction for gender differences. Only two of the seven participating teachers in the study were present for the professional development offered by the school district. When the researchers conducted separate observations of the classrooms, no differences in instructional strategies between all-female and coeducational classrooms were

observed. Thus, this study is truly investigating the effects of separating female students rather than the effects of providing gender-specific instruction.

Self-Concept

This study showed significant negative effects on general self-concept for female students in single-gender classrooms. This finding is in contrast to other studies finding positive (e.g., Cipraini-Sklar, 1996; Riordan, 1990) or no effects (e.g., Lambert, 1998; Lee & Bryk, 1986; Marsh, 1991). As many studies have shown that self-concept is dependent upon social interactions and contexts (Marsh, 1990; Wilson et al., 2010), there may be distinct differences in rural communities. Differences were only found in general self-concept, as opposed to academic self-concept, which suggests that the negative effects may be due to female students in this study comparing appearances, physical abilities, and other non-academic areas in more critical ways in the all-female classes (Granleese & Joseph, 1993). Since there are no pre-intervention data concerning the self-concept of the two groups, differences found after placement in all-female classes may be due to inherent differences between the groups rather than as a result of the intervention. It is possible that parents of girls with low

self-concept were more likely to enroll their daughters in an all-female environment. Future studies should investigate the factors of self-concept among rural female students in more detail.

Discourse

Finally, the discourse analysis may also highlight the unique circumstances of rural education. When differentiating the curriculum for female classes, the teachers engaged in significantly more instances of higher-level thinking in classroom discourse. This finding indicates that while many of the teachers received no formal training in how to change instruction for gendered classrooms, there were significant differences in the level of discourse. Specifically, the all-female classes spent a greater amount of time in higher levels of complex thinking, despite having no differences in academic achievement. Thus, these differences are due to the nature of the discourse in the classrooms and not innate differences in the academic abilities of the students. As the two conditions were taught by the same teachers, differences cannot be attributed to differing teaching styles between instructors. Rather, the discourse varied depending on the characteristics of the classrooms. All-female classes spent more time in complex and higher-order thinking, which could be due to a number of factors, including increased behavior and classroom management concerns in the coeducational classrooms; advanced verbal communication among girls; less inhibitions for female students in all-female environments; or, possibly, a bias in the researcher who conducted the classroom observations. In addition, due to the relatively small number of utterances recorded at the high level (1.7%), generalizations based upon these findings are limited. Future studies of rural populations should investigate teachers' roles and attitudes in classroom discourse.

Limitations

This study has several limitations. As it was only implemented in one school district, the findings may not generalize to other rural communities. This study used a self-selected sample, and female students whose parents selected them for this program may be different from female students in the comparison group on factors not measured in this study. Finally, the self-concept measure was only completed by a subset of students, and although all students in all one participating teacher's classes completed the survey, there may be systematic differences between the measured subset and those students in classes in which the teacher did not administer the survey. Without pre-intervention data, it is unknown if the differences in self-concept between the groups existed prior to the intervention or can be attributed

to the single-gender placements. Future research on the effectiveness of single-gender classrooms in rural contexts could address these concerns, as well as measure long-term effects of the intervention over the course of many years.

Implications

This study is important to the fields of rural education and single-gender education. For rural educators, this research highlights the importance of the consideration of local context in implementing education reform. In particular, educational reform movements that have been shown to be effective in urban environments may not have the same results in rural areas. Factors such as the availability of resources, community support, and demographic differences may influence the results. For example, the level of community support for the education reform itself in this study was not strong, which is of particular importance for tight-knit rural communities (Cruziero & Boone, 2009). In urban and more ethnically diverse communities, single-gender classes have been embraced for both male and female students as a way to curb the lack of academic success (Gewertz, 2007; Singh & Vaught, 1999). However, in this rural community, parents of male students were hesitant to embrace single-gender classes. This school district, while looking for ways to improve achievement and scores on state-mandated testing, adopted single-gender classes. However, this strategy, with mixed research results in other contexts, did not have the desired effect. As rural communities face lower levels of college attainment and expectations (Provasnik et al., 2007), this study has not shown single-gender education to be an effective intervention.

Finally, the present study also has significance to the growing body of research on single-gender education. Specifically, it demonstrates lower self-concept and no differences in achievement for female students in single-gender classrooms in this rural school district. This finding indicates a need for carefully controlled studies of single-gender classrooms in a variety of contexts, including rural districts.

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