



A Comparison of Students' Academic Achievement in English in Single-Sex and Co-Educational Schools

^a Safdar Hussain

^a PhD Scholar, Department of English, Bahauddin Zakariya University Multan, Pakistan

ARTICLE DETAILS

History:

Accepted 18 May 2020

Available Online 15 June 2020

Keywords:

Academic Achievement, English Language, Gender, Single-Sex Schools, Co-Educational Schools

JEL Classification:

I23, P36, P39

ABSTRACT

In this ex post facto research, the difference in students' academic achievement in English has been examined in single-sex and co-educational schools on the bases of data obtained from 576 students from 03 boys' only, 04 girls' only, and 07 co-educational secondary schools from Multan. Students' score in achievement test and gain in grades obtained in the subject of English from 2001 to 2005 were analysed using t-test of independent samples against grouping variable type of school students attended. Statistical control was also applied in the analyses of co-variance over confounding variables associated with students' family and school. Both boys and girls from single-sex schools obtained better score in achievement test and gained better grades than students from co-educational schools and this difference remained statistically significant even after applying statistical control.

DOI: 10.47067/reads.v6i2.230

© 2020 The authors. Published by SPCRD Global Publishing. This is an open access article under the Creative Commons Attribution-NonCommercial 4.0

Corresponding author's email address:

1. Introduction

The educational benefits of single-sex and co-educational schooling for boys and girls have become controversial after the rapid growth of co-educational schools in Pakistan. Even in the developed countries where co-education has become a norm, the question of relative benefits of single-sex and co-educational schooling is still under discussion. Recent studies (Jackson, 2002; Warrington and Younger, 2002) have examined the benefits of single-sex classes for different subjects in co-educational schools in order to address the gap in performance of boys and girls. Western countries adopted co-educational schooling because of its promise of gender equality. That is why along with educational perspective, this subject is also discussed from economic, medical and moral point of view (Arnot, M., 1983, 1984, 1994, 2002; Sax, L., 2005).

2. Literature Review

In any study related to the comparison of single-sex and co-educational schooling, the work of R. R. Dale (Dale, 1969, 1971, 1974) is given special consideration. It has been accepted as a classic work on this subject (A. E. P. 1988). During his 26 years long research in United Kingdom, he conducted surveys

with students and teachers and did action research in both co-educational and single-sex schools to understand their relative merits. He reviewed the research already done on this subject and published findings of his own research in *Mixed or Single-Sex School?* (Dale, 1969, 1971, 1974). He concluded that co-education provided a better environment for students and staff and the question of co-educational and single-sex schooling should not be raised again (Dale, 1974). However, his findings regarding the advantages of co-education for girls are not supported by strong evidence (Caspi, 1995; Riordan, 1990, 1985; Carpenter and Hayden, 1987). Moreover, the work of Dale has now become out dated as values, policies and even laws have changed.

The earlier studies (Dale, 1969, 1971, 1974; Davies, 1950; Valentine, 1950; Moreton, 1939; Clark, 1937; Walton, 1935; Tyson, 1928) found co-educational schooling better for academic and emotional development of students. Whereas, contemporary longitudinal studies confirm that single-sex schooling can produce better results (Grace, 2012; Spielhofer, O'Donnell, Schagen, Benton and Schagen, 2002; Harker, 2000; LePore and Warren, 1997; Lee and Marks, 1990; Lee and Bryk, 1986; Riordan, 1985). However, the results of these studies become insignificant when statistical control on extraneous variables is applied (Marsh 1989). Some of the studies conclude that single-sex schools produce higher academic achievement, self-esteem, self-concept, career and educational aspirations and locus of control (Watson, Quatman, and Edler, 2002; Woodward, Fergusson and Horwood, 1999; LePore and Warren, 1997; Riordan, 1994, 1990, 1985; Brutsaert and Bracke, 1994; Lee and Bryk, 1986). Whereas, remaining studies indicate no effect of co-educational / single-sex schooling on these variables (Harker, 2000; Harker and Nash, 1997; Conway, 1996; Daly and Shuttleworth, 1996; Daly, 1996; Young and Fraser, 1992; Marsh, 1991, 1989; Lee and Marks, 1990; Marsh, Smith, Marsh, and Owens, 1988). Which mode of schooling produces better results is still debatable. Existing research on this subject does not provide final solution. However, it can be seen that in the contemporary studies there is no proof in favour of co-educational schooling. It confirms that earlier supporters of co-educational schooling were fascinated by this idea. Most of this research on this subject was conducted in developed countries where co-educational schools have established as a norm and they are run by state whereas single-sex education is available only in private schools. However in Pakistan, situation is different as most of the government schools are single-sex while private schools are both single-sex and co-educational. Therefore, a comparative study of benefits of single-sex and co-educational schooling was much needed in Pakistan.

3. Research Methodology

The decision about research methodology and sampling techniques was made on the bases of literature review and nature of target population. In the experimental research it is required to manipulate independent variable in order to see its effect on dependent variable(s). However, it was not possible to manipulate independent variable type of school students attended in the present study. Therefore, the ex post facto approach was found to be the most appropriate one for the present study because the main objective was to “explore possible causal relationships among variables that cannot be manipulated by the researcher” (McMillan and Schumacher, 1997). Its literal meanings are in retrospect or after the fact and it refers to a research which investigates possible cause of an effect in retrospect (Gay, Mills and Airasian, 2006). The ex post facto approach was also found useful as the development of students in these schools could also be examined by using their data from previous years.

In an ex post facto research, it is required to statistically control any possible effects of background variables from the effect of independent variable which was type of school students attended in the present study. Whereas, background variables were related to students' family and school such as strength of English language class, medium of instruction, education level of parents, economic status

of the family etc. It was tried to include maximum number of family and school related factors to ensure that reliable results were obtained. Only after statistical control over these background variables, the results could predict the effect of the independent variable precisely. Some of these variables were eliminated during sampling but others which could not be eliminated were statistically controlled in the analysis of co-variance.

3.1 Data Collection

To minimize the background variables related to geographical location, the data was collected from 14 English medium schools situated in Multan. Out of these 14 schools, 03 were boys' only, 04 were girls' only and 07 were co-educational schools. Moreover, the data was collected from students of 10th year only.

An achievement test and students' grades in the subject of English in the previous exams were used to determine students' academic achievement in English. Data related to grades from 2001 to 2005 was collected from school record. For that purpose, a data sheet was prepared to collect data regarding percentage of their marks obtained in the subject of English in the previous years. The same data sheet was also used to collect data related to background variables. The data related to mother tongue of students was also considered but it was not included in the statistical analysis as no student selected English language as mother tongue.

3.2 Achievement Test

As data for this research was collected from large number of students with limited resources, it was not feasible to conduct separate tests of reading, writing, listening and speaking skills to measure students' academic achievement in English. Therefore, an objective type grammar test of 100 marks was prepared from Oxford Placement Test (Allan, 1992) to measure academic achievement in English. It is used all over the world in the educational institutions as a valid and reliable instrument for the assessment of students' proficiency in English (Eckes & Grotjahn, 2006). It consists of two parts; grammar test and listening test of 100 marks each. Only Grammar Test of 100 marks was used for data collection in the present research. It consists of 100 multiple choice questions related to grammar of English. These multiple choice questions are based on the grammatical structures used frequently in the course books of English. Validity and reliability statistics of this test are not given in the manual but its Cronbach's alpha reliability coefficient was 0.888 during piloting in one of the schools in the present study.

4. Data Analyses

For data analysis, a master table was prepared on the bases of data collected from schools. Table 1 given below shows the total number of students included in the present study.

Table 1:

		School Type		Total
		SS*	CoEd**	
Sex	Girls	140	122	262
	Boys	156	158	314
Total		296	280	576

*SS = Single sex / **CoEd=Co-educational

T-test of independent samples, regression analysis and analysis of co-variance were used in data analyses to determine whether students' achievement in English is different in single-sex and co-

educational schools.

4.1 T-Test of Independent Samples

T-test of independent samples is used in the comparison of means of two groups. It is used for continuous variables to determine whether the difference in the mean values is statistically significant (Gay, Mills and Airasian, 2006; Mertens, 1998).

4.1.1 Dependent Variable Achievement Test Score

T-test of independent samples was used to compare students’ achievement test scores taking type of school as a grouping variable for boys only, girls only and combine samples separately. Results of these analyses are given below in table 2.

Table 2:

Achievement Test	Boys-only			Girls-only			Combined		
	SS	CoEd	t	SS	CoEd	t	SS	CoEd	t
N	296	280	5.492*	140	122	3.700*	156	158	6.609*
Mean	50.45	45.40		52.83	49.02		51.57	46.98	
S.D.	8.279	8.025		8.348	8.251		8.382	8.307	

*p<.001 (2-tailed)

Results from t-test of independent samples indicate that students from single-sex schools have performed better as compared to students from co-educational schools in achievement test as their mean difference is 4.598. This difference is statistically significant as probability of error is less than .001 (p<.001). Just like combined samples in separate samples for girls-only, mean difference is 3.805 in favour of single-sex schools (p<.001) and in separate samples for boys-only, mean difference is 5.053 in favour of single-sex (p<.001). It has also been observed that girls had performed better than boys in both single-sex and co-educational schools, that raises another question whether students’ performance in certain subjects is connected to their sex.

4.1.2 Dependent Variable Gain in Grades

T-test of independent samples was also used to compare gain in grades taking type of school as a grouping variable. Gain in grades were calculated by subtracting grade obtained in 2001 from grade obtained in 2005. Results of these analyses are given below in table 3.

Table 3:

Gain = Grade 05 – Grade 01

Gain	Boys-only			Girls-only			Combined		
	SS	CoEd	t	SS	CoEd	Gain	SS	CoEd	Gain
N	156	158	4.584**	140	122	2.966*	296	280	5.372**
Mean	1.0641	.7975		.9643	.7869		1.0169	.7929	
S.D.	.50391	.52649		.43927	.51793		.47627	.52187	

* p<.005, ** p<.001 (2-tailed)

Results from t-test of independent samples indicate that students from single-sex schools have gained more in grades from year 2001 to 2005 than students from co-educational schools as the mean difference of gain in grades is .22403 in favour of single-sex schools and this mean difference is

statistically significant as probability of error is less than .001 ($p < .001$). Just like combined sample in separate samples for girls-only, mean difference is .17740 in favour of single-sex schools ($p < .005$) and in separate samples for boys-only, mean difference is .26663 in favour of single-sex schools ($p < .001$). These differences can be considered a result of students' lack of concentration on the studies in co-educational environment.

4.2 Background Variables

Because the present study is an ex post facto research, it is a possible that the differences found significant in t-test are a result of individual, family or school related confounding variables. Therefore, the data related to confounding variables were analysed against type of school students attended. For the strength of class and age of student, t-test of independent samples was used because these variables are continues variables. For economic status of family, education level of father and mother and sex of the teacher, chi-square test of independence was applied because they are categorical and ordinal variables. Along with combined sample, separate analyses were also conducted for both the sexes, taking boys-only sample and girls-only samples.

In the analyses of background variables, results of t-test of independent samples indicated significant differences in average strength of the class for separate samples for both the sexes as well as for combined sample. Single-sex schools had a relatively higher strength of a class than co-educational schools. The different in the age of students was not statistically significant in all the comparisons. Whereas, results of chi-square test indicated that the difference in the economic status of the family was statistically significant in all the comparisons. In the variable of economic status of family both single-sex and co-educational schools had a relatively low percentage of students from working class and in co-educational schools a relatively high percentage of students from the upper class. This indicated that economic status of the family is a good predictor of choice of school. Only upper and upper-middle class families can afford private English medium schools. Among them the upper class families comparatively prefer co-educational schools and the middle class families prefer single-sex English medium schools. Whereas, working class families have to depend upon government schools which are usually Urdu medium schools.

The difference in the education level of father was statistically significant for girls-only and combined samples whereas the difference in the education level of mother was statistically significant for boys-only and combined samples. Difference in sex of the teacher was statistically significant only for boys-only sample and girls-only sample because teachers of the same sex according to the type of school are appointed in single-sex schools i.e. female teachers in girls-only schools and male teachers in boys-only schools.

Table 4:

Δ = Mean difference

Analysis of Background Variables		Boys-only			Girls-only			Combined		
		SS	CoEd	Δ	SS	CoEd	Δ	SS	CoEd	Δ
Students	Mean	31.22	21.68	9.541	30.61	22.17	8.43	30.93	21.89	9.036
	S.D.	8.12	3.368	***	5.921	3.461	5 ***	7.159	3.411	***
Age	Mean	15.42	15.44	-	15.4	15.32	0.08	15.41	15.39	0.019
	S.D.	0.787	0.786	0.026	0.632	0.836	0.08	0.7179	0.809	0.019
% within School Type										
Economic Status	Low	3.2	0.6	***	5	0	***	4	0.3	***
	Middle	31.2	21		34.7	15.3		32.8	18.4	
	High	15.3	28.7		13.7	31.3		14.6	29.9	
Education of father	Low	21.4	20.8	-	19.7	18.1	*	20.6	19.6	**
	Middle	26	28.9		26.6	26.6		26.3	27.9	
	High	2.6	0.3		6.9	1.9		4.6	1.1	
Education of mother	Low	18.3	25.1	*	22.8	20.5	-	20.4	23	**
	Middle	25.4	21.9		22	22.4		23.9	22.1	
	High	6.4	2.9		8.9	3.5		7.5	3.2	
Sex of the Teacher	Female	0	23.6	***	53.4	20.6	***	24.3	22.2	-
	Male	49.7	26.8		0	26		27.1	26.4	

* p<.05, ** p<.005, *** p<.001

These differences of background variables highlight their importance in the data analysis. Therefore all the background variables whose differences were statistically significant in these comparisons were selected for further analyses for better explanation of the difference in the students' academic achievement in English in single-sex and co-educational schools.

4.3 Data Analysis Using Linear Regression

In ex post facto research, linear regression is a useful test because it can determine the coefficients of linear equation in which one or more independent variables can predict the value of a dependent variable (Mertens, 1998; Gay, Mills and Airasian, 2006). In this study, it was used to compare independent and background variables for their effects on dependent variables.

In a regression analysis all dependent and independent variables need to be entered in quantitative form. Therefore, categorical variables; type of school, sex of the student and sex of the teacher were converted to binary variables. Independent variables: type of school and sex of the student were entered along background variables: number of students in the class, education level of father and mother, economic status of family and sex of the teacher, against each dependent variable. Separate regression analyses were conducted for boys-only, girls-only and combined data.

4.3.1 Dependent Variable Achievement Test Score

TABLE 5:

β = Standardized Beta Coefficients

	Boys-only	Girls-only	Combined Sample
	β	β	β
(Constant)			
Type of School	-.314*	-.268*	-.294*
Sex of Student			-.126*
Students	-0.028	0.014	-0.026
Education of Father	.467*	.603*	.525*
Education of Mother	.401*	.462*	.423*
Economic Status	.390*	.299*	.339*
Sex of Teacher	.012*	.042*	0.021

* $p < .001$

In the regression analysis of achievement test score,

- Type of school emerged as an important predictor ($\beta = -.294, p < .001$) with covariates education of father, education of mother, economic status and sex of the student in combined sample.
- In girls-only data type of school appeared as an important predictor ($\beta = -.268, p < .001$) with covariates education of father, education of mother, economic status and sex of teacher.
- In boys-only data type of school again appeared as an important predictor ($\beta = -.314, p < .001$) with covariates education of father, education of mother, economic status and sex of teacher.

It can be seen in the regression analysis that the type of school students attended is comparatively an important predictor of students' academic achievement in English but the effect of education level of father and mother, economic status of the family, gender of the students and teacher cannot be ignored.

4.3.2 Dependent Variable Grains

TABLE 6:

	Boys-only	Girls-only	Combined Sample
	β	β	β
(Constant)			
Type of School	-.236***	-0.119	-.210****
Sex of Student			0.077
Students	0.033	0.085	0.054
Education of Father	.162***	.164*	.157****
Education of Mother	.127*	.136*	.129***
Economic Status	.169**	0.115	.159****
Sex of Teacher	0.007	-0.049	0.004

* $p < .05$, ** $p < .01$, *** $p < .005$, **** $p < .001$

In the regression analysis for gains in grades,

- Type of school emerged as the most important predictor ($\beta = -.210, p < .001$) with covariates

economic status, education of father and education of mother in combined sample.

- In girls-only data, type of school did not appear as important predictor.
- In boys-only data type of school appeared as the most important predictor ($\beta = -.236, p < .001$) with covariates education of father, economic status and education of mother.

As far as students' academic progress is concerned, type of school proved to be one of the most important predictors along with economic status of family and education level of father and mother.

4.4 Univariate Analysis of Co-variance

T-test of independent samples is suitable to compare mean values when the subjects are randomly assigned to control and experimental groups in an experimental study and it is confirm that any difference in the mean values is due to effect of independent variable only. Whereas in an ex post facto research like present study, students are not randomly distributed in co-educational or single-sex schools. Therefore, it is compulsory to confirm that differences in other predictors were not improving or hiding a significant difference in means.

Therefore, analyses of co-variance were conducted to statistically control confounding variables and to calculate covariate adjusted or estimated marginal means for single-sex and co-educational schools. Statistical control is a technique through which the effects of confounding variables are eliminated from the effect of one independent variable on dependent variables (Mertens, 1998; Gay, Mills and Airasian, 2006). In a quantitative analysis for making a valid inference, it is necessary to keep confounding variables constant to ensure that an effect is due to only one independent variable.

4.4.1 Dependent Variable Achievement Test Score

In order to calculate covariate adjusted mean of achievement test score, analysis of co-variance was performed twice; first controlling only grade obtained in 2001 then controlling both grade obtained in 2001 and covariates identified in the analyses of background variables and linear regression analysis.

Table 7:

Estimated Marginal Means	Type of School	Unadjusted	Adjusted for Grade 01	Adjusted for Grade 01 and Covariates
Boys-only	SS	50.35	52.150	49.813
	CoEd	46.01	47.763	46.552
Girls-only	SS	52.68	54.594	52.534
	CoEd	49.34	53.670	49.500
Combined	SS	51.44	53.310	51.075
	CoEd	47.48	50.726	47.874

4.4.2 Dependent Variable Gain in Grades

In order to calculate covariate adjusted mean of dependent variable gain in grades, analysis of co-variance was performed controlling only grade obtained in 2001. Other covariates identified in the analyses of background variables and linear regression analysis were not included because univariate analysis of variance confirmed that they had interactions with independent variable type of school.

Table 8:

Estimated Marginal Means	Type of School	Unadjusted	Adjusted for Grade 01
Boys-only	SS	1.0641	1.172
	CoEd	.7975	.765
Girls-only	SS	.9643	1.039
	CoEd	.7869	.818
Combined	SS	1.0169	1.122
	CoEd	.7929	.784

It can be seen in the analyses of co-variance that even after controlling confounding variables and students' previous performance, students in single-sex schools have achieved better grades and score on achievement test in English. This difference in their performance can be associated with social and gender environment of these institutions. Students' lower scores in co-educational schools indicates that they are distracted in the presence of members from opposite sex. It can be explained on the bases of gender-segregated society in Pakistan. Here, boys and girls remain separate in almost all the domains of life. When they get a chance to study together in co-educational schools, they find it difficult to concentrate on their studies. Consequently, they achieve less as compared to students in single-sex schools. Hence, this study supports the findings of Woodward, Fergusson and Horwood (1999), LePore and Warren (1997), Riordan (1994), Riordan (1990), Lee and Bryk (1986), Riordan (1985).

References

A. E. P. (1988). Sexism in schools. Durham: Association of Educational Psychologists.

Allan, D. (1992). Oxford placement test. Oxford: Oxford University Press.

Arnot, M. (1983). A cloud over co-education: an analysis of the forms of transmission of class and gender relations. In S. Walker & L. Barton (Eds.), *Gender, Class and Education* (pp. 69-91). Lewes: Falmer.

Arnot, M. (1984). How shall we educate our sons? In Deem, R. (Ed.) *Co-education Reconsidered* (pp. 37-56). Milton Keynes, Open University Press.

Arnot, M. (1994). Male hegemony, social class and women's education. In L. Stone (Ed.) *The Education Feminism Reader* (pp. 84-104). London: Routledge.

Arnot, M. (2002). *Reproducing Gender*. London: Routledge.

Brutsaert, H., & Bracke, P. (1994). Gender context in elementary school. *Educational Studies*, 20(1), 3-10.

Carpenter, P., & Hayden, M. (1987). Girls' academic achievements: Single-sex versus co-educational schools in Australia. *Sociology of Education*, 60, 156-167.

Caspi, A. (1995). Puberty and the gender organization of schools: How biology and social context shape the adolescent experience. In L. J. Crockett and A. C. Crouter (Eds.), *Pathways through adolescence: Individual development in relation to social contexts* (pp. 57-74). Mahwah, N. J.: Erlbaum.

Clark, G. (1937). *Co-education - Analysis of the work and principles of the mixed school*. Unpublished M.A. dissertation. University of Liverpool.

Conway, K. E. (1996). Differential effects of single-sex versus co-education on the mathematical reasoning ability, verbal reasoning ability and self-concept of high school girls. *Dissertation Abstracts International*, 57(12), 5047A. (UMI No. 9717537).

Dale, R. R. (1969). *Mixed or single-sex school? Volume I: A research study about pupil-teacher*

- relationships. London: Routledge & Kegan Paul.
- Dale, R. R. (1971). *Mixed or single-sex school? Volume II: Some social aspects*. London: Routledge & Kegan Paul.
- Dale, R. R. (1974). *Mixed or single-sex school? Volume III: Attainment, attitudes and overview*. London: Routledge & Kegan Paul.
- Daly, P. (1996). The effects of single-sex and co-educational secondary schooling on girls' achievement. *Research Papers in Education*, 11(3), 289-306.
- Daly, P., & Shuttleworth, I. (1996). Determinants of public examination entry and attainment in mathematics: Evidence on gender and gender-type of school from the 1980s and 1990s in Northern Ireland, *Evaluation and Research in Education*, 11, 91-101.
- Davies, W. E. (1950). *A study of the attitudes of secondary school teachers towards co-education, differentiation of the curriculum and sex teaching*. Unpublished Ph.D. dissertation. University of London.
- Eckes, T & Grotjahn, R. (2006). A closer look at the construct validity of C-tests. *Language Testing*, 23(290), 290 - 325. retrieved from <http://ltj.sagepub.com/cgi/content/abstract/23/3/290>
- Gay, L. R., Mills, G. E., & Airasian, P. W. (2006). *Educational research: Competencies for analysis and application*. Upper Saddle River, NJ: Merrill Prentice Hall.
- Grace, A. F. (2012). *The Effects of Single-Sex Education on Short and Long Term Extracurricular Participation*. An honours thesis. The Elon University.
- Harker, R., & Nash, R. (1997, March). School type and the education of girls: Co-ed or girls only? Paper presented at the annual meeting of the American Educational Research Association, Chicago, I11. (ERIC Document Reproduction Service No. ED410633).
- Harker, R. (2000). Achievement, gender and the single-sex / co-education debate. *British Journal of Sociology of Education*, 21(2), 203-218.
- Jackson, C. (2002). Can single-sex classes in co-educational schools enhance the learning experiences of girls and / or boys? An exploration of pupils' perceptions. *British Educational Research Journal*, 28(1).
- Lee, V. E., & Bryk, A. S. (1986). Effects of single-sex secondary schools on student achievement and attitudes. *Journal of Educational Psychology*, 78, 381-395.
- Lee, V. E., & Marks, H. M. (1990). Sustained effects of the single-sex secondary school experience on attitudes, behaviours and values in college. *Journal of Educational Psychology*, 82(3), 578-592.
- Marsh, H. W., Smith, I. D., Marsh, M., & Owens, L. (1988). The transition from single-sex to co-educational high schools: Effects on multiple dimensions of self-concept and on academic achievement. *American Educational Research Journal*, 25(2), 237-269.
- Marsh, H. W. (1989). Effects of attending single-sex and co-educational high schools on achievement, attitudes, behaviours and sex differences. *Journal of Educational Psychology*, 81, 70-85.
- Marsh, H. W. (1991). Public, Catholic single-sex and Catholic co-educational high schools: Their effect on achievement, affect and behaviours. *American Journal of Education*, 99(3), 320-356.
- McMillan, J. H., & Schumacher, S. S. (1997). *Research in education: A conceptual introduction*. New York: Longman.
- Mertens, D. M. (1998). *Research methods in education and psychology: Integrating diversity with qualitative & quantitative approaches*. Thousand Oaks, California: Sage.
- Moreton, F. E. (1939). *Co-education - A statistical enquiry into the attitudes of teachers and a comparative study of the emotional develop of children*. Unpublished Ph.D. dissertation. University of London. Summarised in: *British Journal of Educational Psychology*. 16(2).
- Riordan, C. (1985). Public and Catholic schooling: The effects of gender context policy. *American Journal of Education*, 93, 518-540.
- Riordan, C. (1990). *Girls and boys in school: Together or separate?* New York: Teachers College Press.

pp 82-113.

- Riordan, C. (1994). Single-gender schools: Outcomes for African and Hispanic Americans. *Research in Sociology of Education and Socialization*, 10, 177-205.
- Sax, L. (2005). *Why gender matters: What parents and teachers need to know about the emerging science of sex differences*. New York: Random House.
- Spielhofer, T., O'Donnell, L., Benton, T., Schagen, S., & Schagen, I. (2002). The impact of school size and single-sex education on performance (Local Government Association Report 33). Berkshire, U.K.: National Foundation for Educational Research.
- Tyson, G. (1928). Some apparent effects of co-education suggested by a statistical investigation of examination results. Unpublished M.Ed. dissertation. University of Manchester.
- Valentine, C. W. (1950). *Psychology and its bearing on education*. London.
- Walton, H.M. (1935). Report to Middlesex education committee. Unpublished typescript. In R. Dale (1974). *Mixed or single-sex school? Volume III: Attainment, attitudes and overview*. London: Routledge & Kegan Paul.
- Warrington, M., & Younger, M. (2002). Single-sex teaching in a co-educational comprehensive school in England: An evaluation based upon students' performance and classroom interactions. *British Educational Research Journal*, 28, 353-374.
- Watson, C. M., Quatman, T., & Edler, E. (2002). Career aspirations of adolescent girls: Effects of achievement level, grade, and single-sex school environment. *Sex Roles*, 46, 323-335.
- Woodward, L. J., Fergusson, D. M., & Horwood, L. J. (1999). Effects of single-sex and co-educational secondary schooling on children's academic achievement. *Australian Journal of Education*, 43, 142-156.
- Young, D. J., & Fraser, B. J. (1992, April). Sex differences in science achievement: A multilevel analysis. Paper presented at the annual meeting of the American Research Association, San Francisco, Calif.