

# Review of Single-Sex School

Wenqing Chen<sup>1, a, \*, †</sup> Jiayi Liu<sup>2, b, \*, †</sup> Xinjie Xu<sup>3, c, \*, †</sup> Siyi Zhang<sup>4, d, \*, †</sup>

<sup>1</sup> Sichuan University of Culture and Arts, Sichuan, China

<sup>2</sup> Rutgers University, New Jersey, United States

<sup>3</sup> James Cook University, Singapore

<sup>4</sup> East China Normal University, Shanghai, China

\*Corresponding author. Email: <sup>a</sup>chenwenqing999@gmail.com, <sup>b</sup>jl2348@scarletmail.rutgers.edu

<sup>c</sup>xinjie.xu@my.jcu.edu.au, <sup>d</sup>10181180214@stu.ecnu.edu.cn

<sup>†</sup>These authors contributed equally.

## ABSTRACT

This paper reviews the practice of single-sex education in recent years and its influence on students in various aspects. In addition, this paper investigates the origin, development, and decline of single-sex education, which is closely related to the background of The Times and the idea of gender equality. In addition, this study reviews the history, development, and reasons for the rise of single-sex education. Through research the policy reforms, the history of single-sex schools, comparing the differences between male and female learning styles and co-education. Then summarize the girl's achievements in single-sex education, which have been and have not been clearly demonstrated. Finally, it discussed the current limitations of single-sex education and future research directions, especially the improvement of the campus environment to reduce the influence of stereotypes in providing equal education. This research can enable us to better understand the background, achievements, and influence of single-sex education and provide a reference for future researchers in the field of single-sex education.

**Keywords:** *single-sex school, education, influence factor.*

## 1. INTRODUCTION

### 1.1. Definition of Single-Sex School

Single-sex schools are also called gender-segregated education. It is an education process in which male and female students of biological sex participate in different classes separately [1]. The main reason for separation education is as follows, indeed confirmed that due to gender differences, and in most cases, boys and girls have different learning styles [2]. According to the existing neuroscience research, there are profound differences between the "male brain" and the "female brain" at different levels, and there will be some differences in their way of thinking and perception of things [2]. Therefore, to the characteristics of students of different genders, a teaching environment suitable for boys or girls is specially set up.

As a school, the indispensable purpose is to better develop conducive to children's early development and especially the healthy development of personality characteristics. However, in co-educational schools, there will still be issues of gender prejudice and

stereotypes. Girls would be more afraid or shy to show themselves in school and often reduce their enthusiasm for learning or participating in campus activities [3]. According to research, the establishment of single-sex classes can be used to improve girls' academic performance so that girls can gain inner self-confidence through the school model [3]. Single-sex schools become the most direct way to reduce discrimination and inequality caused by different genders in education. The purpose of these types of courses is to better prepare girls and boys for the different social roles as adults in the future.

### 1.2. History of Single-Sex Class

Historically, the education of knowledge and skills was primarily targeted at males, with little education for girls and mainly concentrated on religious and moral training [4]. In the late 18th century in the United States, there were always significant differences in what boys and girls were taught from school and their parents. Boys were taught English, math, history, and other varied fields of discipline, while girls were only taught to sew or be

good mothers [4]. This educational inequality gradually began to be taken seriously by society and government over the next century. To provide women with equal access to education, Title IX of the education amendments enacted in 1972 prohibited sex discrimination in schools receiving federally funded educational programs [5]. After the announcement of Title IX, specialized schools or classes for single-sex began to appear in the United States [6]. In the United States, at the beginning of the 21st century, parents' demand for single-sex education, which they considered would reduce student distractions. It began to gradually increase due to the majority belief that the inherent gender differences between boys and girls required distinct modes and methods of instruction for the different genders [4]. With this expectation in mind, Bigler and Signorella indicate that the number of single-sex schools grew significantly in the early 21st century, though not nearly as much as mixed-sex schools. It is enough to show that single-sex education is being taken more into account [6].

### ***1.3. California Single-Sex Academy Pilot Program***

Since the 1990s, some experimental single-gender schools have been set up in the United States, especially the first large-scale single-gender public school experiment in California, which has improved the academic achievement of female school students [7].

The experiment with single-gender education in public schools called the California Single Gender Academy Pilot Program began in 1997 and ended in 1999 [8]. Six districts opened single-gender academies (both boys and girls) due to California Governor Pete Wilson's legislation and funding for a single-gender academies pilot program in the public school system. The program was designed to support the achievement of high-risk boys and encourage more participation of girls in science and mathematics classes by expanding educational options. Fund totalling \$500,000 per year for each district was only provided two years, and legislators did not support continuing the program after Governor Wilson left office [9].

Though the program only lasted for a short time, it offered many advantages and disadvantages of a single-sex school. According to researchers Hubbard and Datnow, the failure of the program included a lack of planning time before implementing the single-gender format, little to no teacher or staff training before implementing the program, a limited source of income and resources to support the program, and a lack of support from the community [10]. One benefit noted from the program was an increased focus on academics without the distraction of the opposite sex in the classroom [10]. The single-gender pilot program's

success was also attributed to increased resources and caring teachers [11].

### ***1.4. Causes of the Contemporary Rise in Single-Sex Schooling***

According to collection data, there has been a significant increase in the number of single-sex schools at contemporary. The number of American public schools offering single-gender instruction has increased from three in 1995 to over 500 in 2012 [12]. By the 2003-2004 academic year, at least 22 public schools had provided different forms of single-gender education. Among them, 63 schools provide single-gender teaching classes, and 25 schools provide complete single-gender education [7].

Changes in the policy and related acts fundamentally promoted the increase of single-sex education in public schools: The first factor is traced back in history to Title IX of the Education Amendments of 1972 was passed, which explicitly prohibited gender discrimination in government-funded education projects. The United States proposed that the courses and activities related to single-sex education should be prohibited, which has aroused wide discussion from all walks of life. In 2001, the No Child Left Behind (NCLB) Act was enacted, and The U.S. Department of Education further modified title IX to legalize single-gender education in American public schools [13]. Since then, single-sex education in American public schools began to develop rapidly.

The second factor for the increase of single-sex education is that education reformers focus more on the physiological differences of male and female system structure [14]. In addition to observing visible physical differences, researchers also point out the physical, emotional and social development of males and females, and specific brain differences [15-17]. Researchers hope to distinguish between male and female education and claim the benefits of single-sex education by verifying the existence of sex differences in the brain. For example, in 1861, the French surgeon, Paul Broca, weighed 422 brains and concluded that men are more intelligent than women because their brains are heavier [18]. Although these theories were not proven to be strong evidence of male and female IQ differences, the educational community insists on defining curriculum reform according to these assertions [19].

## **2. THE BENEFIT OF SINGLE-SEX SCHOOL**

### ***2.1. Single-Sex Education and Achievement***

There have been considerable differences in the results of studies on the effects of single-sex teaching on girls' achievement. In some research, girls who receive single-sex schooling presumably perform better in coeducation [20]. However, studies also have shown a

benefit for girls in co-education school, although this effect was analyzed only in the context of white students [21]. Based on current research, there is no conclusive evidence regarding single-sex education and its relationship to achievement.

### *2.1.1. Language and Mathematics Achievement*

Women are generally considered to have certain advantages in language learning and verbal expression, so language subject in single-sex studies is rarely compared to coeducation schools. Riordan (1985) did find that girls had higher reading scores in all-female Catholic schools than in coeducation [22]. According to the database of Lee and Bryk (1986), girls in a female environment will score higher in reading than in a coeducational environment [23].

In some studies, girls scored higher in single-sex classes than coeducation and took more math and science courses in high school [24]. In other studies, however, single-sex education does not affect girls' math achievement [25].

### *2.1.2. Self-Concept*

Self-concept is an experience in which one gradually deepens one's understanding of oneself through experience, reflection, and feedback from others. Self-concept has been shown to have a long-term impact on students' outcomes and future goals [26].

The result is still uncertain whether single-sex education significantly improves women's self-concept. Sullivan's (2006) study confirms that empirical results on single-sex schooling, self-esteem, self-concept, and participation in atypical gender studies are mixed [27]. There was no difference between general and academic self-concept among students of private Catholic schools [28, 29].

Nevertheless, feminists believe that by providing a more supportive environment, single-sex schools/classes can provide a liberating experience for young girls, contributing to positive self-concept and subject choice [30].

## **2.2. Change Behavior**

For adolescent girls, Single-sex schools can reduce girls' attention to appearance, enhance self-esteem, and increase risky behavior [31,32]. Cribb and Haase (2016) experimentally revealed that the presence of the opposite sex in mixed schools made girls more inclined to pursue the socially biased thin ideal, even leading to low self-esteem [31]. While girls in single-sex schools will focus on self-success and staying fit for their health, leading to higher self-esteem than in mixed schools [31]. Additionally, girls in single-sex environments would exhibit more risk and competition than girls in mixed-sex

schools, which more closely resemble boys in the traditional sense [32]. All of the above information suggests that the single-sex school environment can disengage girls from behaviors that conform to the traditional perception of females.

From the boys' perspective, boys in single-sex schools have significantly higher reading levels and language arts attainment than boys in co-educational schools [33]. And because of innate biological differences in the degree of brain development between males and females, boys' brains develop more slowly. They are more susceptible to sympathetic nervous system influences leading to excessive behavior in the face of stress [34]. Therefore, in co-educational schools, boys will exhibit relatively more behavioral problems. Whereas in single-sex schools, boys' behavioral problems are ameliorated, and classroom participation is increased. This is since boys' schools will design more targeted instruction based on their active traits [34].

## **2.3. Learning-Style Differences between Boys and Girls**

Boys and girls have different learning styles, and the main factor depends on the difference in physiology [2]. First of all, the brain perception abilities of men and women are slightly different [2]. Girls' hearing generally is better than boys', and girls can concentrate more calmly on writing, reading, etc., while their related listening and lecture tests will be relatively better [35]. Boys generally have better kinesthetic nerves and spatial thinking. They found it boys difficult to sit down and continue to focus on learning. In most cases, they will be good at using graphics and body movements to master learning concepts [35].

In addition, it is not only the perception leads to the differences in the learning styles of boy and girl, but also different learning attitudes of students themselves. In coeducation school, boys usually dominate the discussion in the classroom, while girls may not participate in class questioning and even become negative [36]. In single-sex schools, it is found can eliminate the stereotypes brought by gender and also greatly enables girls to make improvements in subjects such as mathematics and biology [37]. After adopting single-sex education, it will be more conducive for girls to explore knowledge and cultivate interest in subjects they are not good at [37].

## **2.4. Single-Sex Education and Discourses of Faith and Culture**

According to Christine Skelton, Becky Francis, and Yordanka Valkanova, cultural, social, political, religious, and other dimensions are also important dimensions that should be focused on in single-sex education [38].

Muslim society has maintained the characteristics of gender segregation so far, which prefer single-sex education due to its specific discourses of family and sex [39]. Though religious texts do not support it, the Islamic notions of sex, sexuality, and morality lead to a segregator tendency. Sexual activity is highly proscribed and circumscribed in Islam, and any sex outside marriage is strictly forbidden [40]. The education of sex, morality, and marriage, which are active in the host society, will be considered as negative factors by Muslim parents [41]. Besides, arranged marriage is another powerful discourse influencing parental preference for single-sex education. Girls in co-education may choose to exercise personal choices, defying collective decisions by their family [41].

Besides, Asian parents are very protective of their daughters because of their perceptions of English society's problems with drugs, alcohol, and undue emphasis on sex. Keeping distance from the indigenous society and their culture, being educated in a single-sex school is considered a solution by the amount of Asia parents [42].

### 3. FURTHER DIRECTION

Based on the analysis of boys' and girls' different physiological structures and characteristics, educators and schools should have special countermeasures. However, there are still have many opponents who considered that single-sex schools have problems that will affect the growth of young people. Especially for the growth of a child, it is necessary to receive a good education. In the future education process, the school should provide children with the equal right access to education, reducing stereotypes in class. Teachers should be more active in encouraging girls' and boys' enthusiasm in learning and promoting the teaching atmosphere.

### 4. CONCLUSION

This paper reviews the practice and influence of single-sex school education, as a gender-segregated attempt, of the past years. The study has reviewed the source, development, and decline of single-sex education, which is highly related to the time background and gender equality thoughts. Moreover, based on existing single-sex education practices, The paper concludes the benefit of single-sex school into language and verbal achievement, mathematics achievement, self-concept, behavior changing, and learning-style changing. Faith and culture are also considered to be reinforced by single-sex education. Overall, we wish that these findings could be good references for those who plan to contribute to future single-sex education and gender equality in the education area. In addition, the results of our paper could be helpful to policy decision-makers to support their educational development.

### REFERENCES

- [1] Salomone, R. (2006). Single-sex programs: Resolving the research conundrum. *Teachers College Record*, 108(4), 778-802.
- [2] Eliot, L. (2013). Single-sex education and the brain. *Sex roles*, 69(7-8), 363-381.
- [3] Pollard, D. S. (1999). Single-sex education. *Women's Educational Equity Act Publishing Center Digest*, 1.
- [4] Liben, L. S. (2015). Probability values and human values in evaluating single-sex education. *Sex Roles*, 72(9-10), 401-426.
- [5] Hughes, T. A. (2006). The Advantages of Single-Sex Education. *National Forum of Educational Administration and Supervision Journal*, 23(2), 5-14.
- [6] Bigler, R. S., & Signorella, M. L. (2011). Single-sex education: New perspectives and evidence on a continuing controversy. *Sex roles*, 65(9-10), 659-669.
- [7] Madigan, J. C. (2009). The education of women and girls in the United States: A historical perspective. *Advances in Gender and Education*, 1(1), 11-13.
- [8] Mead, J. F. (2003). Single-gender "Innovations": Can publicly funded single-gender school choice options be constitutionally justified? *Educational Administration Quarterly*, 39(2), 164-186.
- [9] Zwerling, E. (2001). California study: Single-sex schools no cure-all. Retrieved March 10, 2008, from <https://womensenews.org/2001/06/california-study-single-sex-schools-no-cure-all>
- [10] Datnow, A., Hubbard, L., & Woody, E. (2001). Is Single Gender Schooling Viable in the Public Sector? *OISE*.
- [11] Hubbard, L., & Datnow, A. (2005). Do single-sex schools improve the education of low-income and minority students? An investigation of California's public single-gender academies. *Anthropology & Education Quarterly*, 36(2), 115-131.
- [12] Nidoy, R. (2012). Benefits of all-boys and all-girls schools. *Reason*.
- [13] Sax, L. (2005). The promise and peril of single-sex public education. *Education Week*, 24(25), 34-35.
- [14] Chadwell, D. W. (2010). *A Gendered Choice: Designing and Implementing Single-Sex Programs and Schools*. Oaks, California: Corwin Press.
- [15] Brizendine, L. (2010). Love, sex and the male brain. *CNN*, March 25.

- [16] James, A. N. (2009). *Teaching the female brain: How girls learn math and science*. Thousand Oaks, CA: Corwin Press.
- [17] Williams, J. A. (2010). Learning differences: Sex-role stereotyping in single-sex public education. *Harvard Journal of Law & Gender*, 33(2), 555–579.
- [18] Tyre, P. (2008). *The trouble with boys*. New York, NY: Three River Press
- [19] Halpern, D. F., Eliot, L., Bigler, R. S., Fabes, R. A., Hanish, L. D., Hyde, J., ... & Martin, C. L. (2011). The pseudoscience of single-sex schooling. *Science*, 333(6050), 1706-1707.
- [20] Spielhofer, T., O'Donnell, L., Benton, T., Schagen, S., & Schagen, I. (2002). The impact of school size and single-sex education on performance (p. 33). Slough: National Foundation for Educational Research.
- [21] Daly, P. (1996). The effects of single-sex and coeducational secondary schooling on girls' achievement. *Research Papers in Education*, 11(3), 289-306.
- [22] Riordan, C. (1985). Public and Catholic schooling: The effects of gender context policy. *American Journal of Education*, 93(4), 518-540.
- [23] Lee, V. E., & Bryk, A. S. (1986). Effects of single-sex secondary schools on student achievement and attitudes. *Journal of educational Psychology*, 78(5), 381–395.
- [24] Shapka, J. D., & Keating, D. P. (2003). Effects of a girls-only curriculum during adolescence: Performance, persistence, and engagement in mathematics and science. *American Educational Research Journal*, 40(4), 929-960.
- [25] Conway, K. E. (1996). Differential effects of single-sex versus coeducation on the mathematical reasoning ability, verbal reasoning ability, and self-concept of high school girls. ProQuest Dissertations Publishing.
- [26] Wilson, H. E., Siegle, D., McCoach, D. B., Little, C. A., & Reis, S. M. (2014). A model of academic self-concept: Perceived difficulty and social comparison among academically accelerated secondary school students. *Gifted Child Quarterly*, 58(2), 111-126.
- [27] Sullivan, A. (2006). Academic self-concept, gender and single-sex schooling in the 1970 British Cohort Study. CLS Working Paper.
- [28] Marsh, H. W. (1991). Public, Catholic single-sex, and Catholic coeducational high schools: Their effects on achievement, affect, and behaviors. *American journal of education*, 99(3), 320-356.
- [29] Lambert, J. (1998). An investigation of the difference in multidimensional self-concept between adolescent girls in single-sex and coeducational school settings. Widener University, Institute for Graduate Clinical Psychology
- [30] Smithers, A., & Robinson, P. (2006). *The paradox of single-sex and co-educational schooling*. Buckingham, United Kingdom: Carmichael Press.
- [31] Cribb, V. L., & Haase, A. M. (2016). Girls feeling good at school: School gender environment, internalization and awareness of socio-cultural attitudes associations with self-esteem in adolescent girls. *Journal of Adolescence*, 46, 107–114.
- [32] Laury, S. K., Lee, D. J., & Schnier, K. E. (2019). Will girls be girls? Risk taking and competition in an all-girls' school. *Economic Inquiry*, 57(3), 1408–1410.
- [33] Laster, C. (2004, 09). Why we must try same-sex instruction. *The Education Digest*, 70, 59-62.
- [34] Piechura-Couture, K., Heins, E., & Tichenor, M. (2011). The boy factor: Can single-gender classes reduce the over-representation of boys in special education? *Journal of Instructional Psychology*, 38(3), 255-263.
- [35] Honigsfeld, A., & Dunn, R. (2003). High school male and female learning-style similarities and differences in diverse nations. *The Journal of Educational Research*, 96(4), 195-206.
- [36] Nosrati, V. (2015). Gender and classroom behavior: The case of Iranian EFL learners. *Journal of Applied Linguistics and Language Research*, 2(5), 9-18.
- [37] Almasri, F., Hewapathirana, G. I., Ghaddar, F., Lee, N., & Ibrahim, B. (2021). Measuring attitudes towards biology major and non-major: Effect of students' gender, group composition, and learning environment. *PloS One*, 16(5), e0251453–e0251453.
- [38] Skelton, C., Francis, B., & Valkanova, Y. (2007). *Breaking down the stereotypes: Gender and achievement in schools*. London: Roehampton University.
- [39] Shah, S., & Conchar, C. (2009). Why single-sex schools? Discourses of culture/faith and achievement. *Cambridge Journal of Education*, 39(2), 191-204.
- [40] Al-Ghazali, H. (1995). *On Disciplining the Soul*. The Islamic Texts Society: Cambridge. Islamic Texts Society.
- [41] Shaw, A. (1988). *A Pakistani Community in Britain*. Oxford: Basil Blackwell.

- [42] Ali, R. E. (1996). The youth Service and the young Asians in Peterborough. PhD, University of Nottingham cited in Haw, K. *Educating Muslim girls: Shifting discourses*. Buckingham: Open University Press.