

The Influence of Sex (Gender) Differences on the Student Engagement and Academic Achievement of Middle School Students in China

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Abstract: This article examines the influence of gender on student engagement and academic achievement of middle school students in China. School education plays a major role in reducing gender inequality and promoting equality. This study aims to analyze the influence of gender on student engagement and academic achievement in China. It is important to have a more comprehensive understanding of the influence of gender on student performance. A quantitative survey method was used to conduct a T-test to compare the means between boys and girls in their engagement and academic achievement. Simple random sampling was used to select participants from secondary schools in China (n = 341). The findings of the study indicate that student gender does not significantly affect student engagement or have a significant impact on academic achievement. This study analyzes the findings in terms of the changing role of women in China's rapid development and changes in Chinese culture and policies, which predict important implications for advocating for gender equality in education. The practical contributions of this study are for teachers, school managers, and parents to formulate strategies to eliminate gender inequality, especially in educational institutions.

Keywords: Academic Achievement, Gender Differences, Student Engagement, Tiongkok.

Abstract: Artikel ini mengkaji tentang pengaruh jenis kelamin terhadap keterlibatan siswa dan prestasi akademik siswa sekolah di Tiongkok. Pendidikan sekolah memainkan peran utama dalam mengurangi ketidakadilan gender dan mempromosikan kesetaraan. Studi ini bertujuan untuk menganalisis pengaruh gender pada keterlibatan siswa dan prestasi akademik di Tiongkok. Hal ini penting untuk memiliki pemahaman yang lebih komprehensif tentang pengaruh gender dalam hal kinerja siswa. Metode menggunakan survei kuantitatif dilakukan untuk melakukan uji T untuk membandingkan rata-rata antara anak laki-laki dan perempuan dalam keterlibatan dan prestasi akademik mereka. Pengambilan sampel acak sederhana digunakan untuk memilih peserta dari sekolah menengah di Tiongkok (n = 341). Temuan penelitian menunjukkan bahwa gender siswa tidak secara signifikan memengaruhi keterlibatan siswa atau berdampak signifikan pada prestasi akademik. Studi ini menganalisis temuan dalam hal perubahan peran perempuan dalam pembangunan Tiongkok yang pesat dan perubahan dalam budaya dan kebijakan Tiongkok, yang meramalkan implikasi penting dari advokasi untuk kesetaraan gender dalam pendidikan. Kontribusi praktis hasil penelitian ini untuk guru, manajer sekolah dan orang tua untuk merumuskan strategi menghilangkan ketidakadilan gender khususnya di lembaga pendidikan.

Keywords: Keterlibatan Siswa, Perbedaan Gender, Prestasi Akademik, Tiongkok.

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Introduction

Gender is a descriptive term that distinguishes males and females. Gender is usually believed to be related to social, psychological, and behavioral styles, while sex is usually more physiological (Pryzgoda & Chrisler, 2000). Gender distinction is based on social and cultural influences or constructs, which ultimately gives birth to different functions and roles (Noeleen Heyzer, 1935, p. 12; Noeleen Heyzer, 1988, p. 31). Roles and functions between men and women are formed based on cultural or societal constructs create gender differences. Gender differences are basically not the issue, but gender injustice and role limitation due to gender differences are the real challenges, especially injustice to females due to gender differences.

In reality, the distinction of roles and functions that are formed based on cultural construction is often misunderstood, as if the distinction is formed based on natural nature. The inaccuracy in understanding the term of gender may later gave birth to a negative stigma and paradigm against women, so that women often get unjust practices, and this is reinforced by legal legitimacy, both written law and unwritten customary law. The misinterpretation of gender distinctions based on cultural and social constructs has also given rise to more imaginary “realities”. For instance, the assumption or labeling that men have privileges while women are weak creatures is a labeling that stems from myths that are born or sourced from the constructs of society that have prevailed for so long. Another myth, for example, about sperm as a source of life, this sperm lebelization is sourced and owned by men not women, while women only receive, this has an impact on the stigma that women are second-class and weak human beings (Subhan, 1999).

This justification unwittingly creates a social perception in the form of a myth that men have a higher value than a woman. Thus, the discrimination that occurs in the domestic sphere is a type of gender injustice that eventually gives birth to gender roles in which one party becomes superior to the other. In educational field, gender differences are reflected in kinds of areas such as gender differences affect the perception of the intellectual or academic intelligence of males and females in educational institutions. There has been an ongoing debate about the level of intelligence of men and women. Stereotypes of men and women have still persisted to date. Some scientists try to explore and explain the male-female differences by means of scientific studies of the brain, psychology, and culture. But the disparate results of the various studies doom the debate on the impact of gender differences to more exploration. Nevertheless, we should clearly understand the connotations of gender equality when explore more about gender differences. Gender equality does not mean that males and females are identical, but rather that the diversity of the different groups of males and females is recognized and that the interests, needs and priorities of both men and women are taken into account, which means that their rights, responsibilities and opportunities are equal and do not depend on that they were born males or females, which indicates that gender equality as a human rights issue (Canton, 2021).

Eliminating gender disparities and achieving gender equality is one of the goals of the EFA, in particular to ensure equal access to and completion of quality education for girls (UNESCO, 2000). Sustainable Development Goals (SDGs) 4 and 5 also emphasize education quality and reducing gender inequality. Achieving gender equality or justice have been taken as an international consensus in education priorities (Subrahmanian, 2005). However, differences in gender in realities tend to create some injustice against different gender groups, which leads to gender inequality. Over the past decades, the international community has been making great efforts to eliminate gender inequality in education (Chisamya et al., 2012). Nevertheless, David (2015) clarifies that although there have been welcome changes in the

field of education with regard to gender inequality, such as the achievement of gender balance at the undergraduate level, this does not mean that gender equality has been achieved. Despite the fact that there are more females in school than ever before, Amiya (2022) noted that they may not have the same equal opportunities as boys to benefit from the subjects they prefer. Girls' learning is impeded by injustice and differing expectations, which also have an impact on the quality of their education (Amiya, 2022). Because gender differences lead to stereotyping of different genders, for example, in physical education programs, girls are often believed to be less involved in sports and boys are stereotyped to be more willing to participate in sports because sports are believed to be associated with male strength, power, and endurance (López-Morales et al., 2023).

Gender stereotypes also limit women's self-identification in STEM fields, which affects their level of interests, options, and development in the field (Amiya, 2022). In addition, teachers may have different expectations of boys and girls when it comes to behavioral performance, which can lead to labeling effects (Amiya, 2022). For example, many teachers believe that girls are generally quieter and more submissive, and therefore, teachers take for granted that girls are better at behavioral engagement such as being more disciplined in class. Recently, secondary school students were believed to be one of the main groups with gender gaps though gender inequality was found to have narrowed in some low-income countries (Simpson et al., 2020). Therefore, a more detailed understanding of how students of different genders perform in their studies may help to ameliorate this gender perception bias and existing gender inequities, especially it is essential to have a more comprehensive understanding of the effect of gender differences in terms of academic achievement and performance in different societies with various culture.

Education for All (EFA) recommended measuring the achievement of basic education through the examination scores of all boys and girls (Subrahmanian, 2005). But nowadays, changes in classroom such as the shift from teacher-centered to student centered and the transformation in the labor market signal the inadequacy of measuring students' outcomes in terms of single examination scores. Student engagement is closely linked to this new shift, which concerns more on student intrinsic motivation and effort investigations (Newmann, 1992). Generally, student engagement reveals the extent of positive participation in an activity or task (Fredricks et al., 2004).

It has been believed to be one of the most positive factors in facilitating adolescent development (Lerner et al., 2011). It is widely accepted that student engagement encompasses three dimensions: behavioral engagement, affective engagement, and cognitive engagement (Söderholm et al., 2023). Behavioral engagement is related to student participation in learning and extracurricular activities. Emotional engagement, on the other hand, involves positive or negative responses from students to teachers, students, and the school. Whereas cognitive engagement is associated with learning strategies and thoughtfulness of learning (Fredricks et al., 2004). Despite the priority of student engagement as a student-centered classroom in the new era of education, little research has been done on gender differences in student engagement.

Several studies have shown that gender differences do affect the performance of boys and girls in school (Leaper, 2015; Lei et al., 2018; Marcenaro–Gutierrez et al., 2018). Gender gaps are found in reading and writing test scores in the US and other OECD countries (Voyer & Voyer, 2014). There is a trend that girls are usually better academically and in terms of language proficiency (Leaper, 2015). Voyer and Voyer (2014) also support the fact that in terms of total academic achievement, girls outperform boys from elementary school. Marcenaro–

Gutierrez et al. (2018) revealed that boys are more likely to have higher grades than girls in secondary school. However, Leaper (2015) revealed, in a meta-analysis, that by comparing the spatial abilities of boys and girls, it is generally seen that boys are superior. Similar findings were also shown in the science exam results for 15-year-old students in 27 EU member states, which showed that boys scored better on average than girls in terms of overall science achievement. Meanwhile, no significant gender gap in math achievement on standardized tests was found until adolescence (Leaper, 2015). In addition, according to statistics from the US National Center for Education Statistics (2013), Leaper (2015) confirmed the result that, by comparing African Americans and Latinos with white European or Asian Americans, the gender gap in high school and college is larger in the former group. Leaper (2015) also supports that the gender gap is larger after entering high school. Lei et al. (2018) recognized that gender has an effect on the relationship between cognitive engagement and students' academic achievement, specifically showing that the relationship between cognitive engagement and academic achievement tends to be stronger in girls than boys. However, Bae and DeBusk-Lane (2019) confirmed that gender does not significantly predict students' science engagement. In Egypt, Abulela and Bart (2021) also found that gender had no statistical impact on student engagement. Furthermore, a study by Francis et al. (2023) showed that there was no significant difference in students' gender in academic performance in the friendly scaffolding learning model. And more recently, Li et al. (2024) found that gender stereotypes in language learning influence student engagement indirectly, which showed female had more active engagement in language learning.

Three facts can be seen from previous studies: firstly, the results of the impact of gender differences on student performance in diverse social contexts varied; secondly, the idea of gender injustice still exists, which may be a more potential factor influencing student performance rather than sex itself; and thirdly, there is little attention paid to student engagement in the studies of the influence of gender differences on student performance. Therefore, examining the impact of gender differences in a broader societal and cultural context would help to fully understand the effect of it and ultimately promote gender equality.

Gender differences are an important cause of gender inequality, but it is easy to see from previous research that the effects of gender on student participation and achievement are complex, and that there is not always one gender that is necessarily more prominent in certain academic performance. Analysis of the quality of education needs to take into account the changing dynamics of masculinity and femininity in a broader social context (Aikman et al., 2011). An important factor in the different results is that the students in these studies were in different "social environments" which is ranging from different classrooms to cities and even to countries. As mentioned earlier, gender is a socially and culturally constructed concept, so it is crucial to see socio-environmental influences when studying the effect of gender differences.

Thus, the purpose of this study is to analyze whether student gender is a factor on student engagement and academic achievement in middle schools in a Chinese context. The research question of this study is 1). Does gender influence student engagement among middle school students in China? 2). Does student gender influence academic achievement among middle school students in China? There have been several studies related to the effect of student gender differences on cognitive abilities in the context of learning achievement and this article complements the review of previous studies.

Methods

This study uses a quantitative method, which aims to investigate the influence of student gender on student engagement and academic achievement. The sample were randomly selected from students in middle schools in Qingdao China. There are five major urban districts (excluding West Coast New District) with a total of 86 junior high schools in Qingdao. The target population of this study is students from junior secondary schools in Chengyang district which has 19 junior high schools with nearly 3,0000 students enrolled. The reason the researcher selected a sample from this district is because Chengyang was built the latest among the five districts in Qingdao, and its educational development has become one of the most important and increasing focus areas. For each defined population, the sample size can be obtained using the Morgan Sample Table (Krejcie, 1970). In this study, the sample size was 379 based on Morgan Sample Table.

The instrument of measuring student engagement was adapted from Student Engagement in Schools Questionnaire (SESQ) verified by Hart et al. (2011) and Student Engagement in School-Four-Dimensional Scale developed by Veiga (2016). Three dimensions covering cognitive engagement, affective engagement, and behavioral engagement are used to combinedly measure student engagement. Specifically, there are 3 items under cognitive engagement, 4 items under emotional engagement, and 4 items in behavioral engagement. All these questions were required to rate their agreement statements on a 5 Likert scale (1 = strongly disagree, 2 = disagree, 3 = somewhat agree, 4 = agree, 5 = strongly agree). The validity is verified by Exploratory Factor Analysis (EFA). The result showed that the KMO value is 0.871 ($p < 0.001$). The rotated factor loading of each item under every dimension is from 0.682 to 0.847. Cronbach's alpha coefficient of cognitive engagement, emotional engagement, and behavioral engagement are 0.803, 0.716, and 0.890, which are good reliability to measure student engagement.

The measurement of academic achievement is final average examination scores of three subjects (Mathematics, Chinese, English). The reason for choosing the average scores of these three subjects as a measure of students' academic achievement is that the results of the public high school entrance examination in Qingdao are largely based on the total score of these three subjects. The cumulative grades for these three subjects are shown as special grades, totaling 360 (120 points for each subject). The grade used in this study is the average grade from the final exam in the second semester. There are two semesters with two final exams held each year in secondary schools in Qingdao: the first semester (final exams held in January or February) and the second semester (final exams held in June or July).

In terms of data collection, permission was obtained from the faculty in the first step. Then, the approved questionnaire was given to the school administrator for permission. After approval was given, students who had permission from parents or guardians in this study were selected based on the simple random sampling method. The questionnaires were distributed directly to the students. All questionnaires were completed anonymously by the students who volunteered. However, since not all the distributed questionnaires were returned, only 341 data were finally obtained. Among the participants, the percentage of male students was 46.6% and female students 53.4%; students from Grade 7 were 29.9%, Grade 8 were 37.8%, and Grade 9 were 32.3%.

SPSS version 27.0 was used for statistical analysis. Independent-Samples T-test analysis was used to explore whether there are any differences between male and female students on their engagement covering cognitive, emotional, and behavioral engagement, and academic achievement which is reflected by student final examination scores.

Findings

To answer research question 1 and research question 2, a T-test analysis was used. The results of the Independent Samples Test of student engagement are shown in Table 1. Overall, it shows that there are no obvious differences between male students and female students ($p=0.05$). Specifically, no significant differences were found in emotional engagement ($p=0.119$) and behavioral engagement ($p=0.198$) among boys and girls. But a significant difference was found in cognitive engagement between boys and girls ($p<0.05$), which shows that the mean value of cognitive engagement among boys is 3.95 ($M=3.95$) and the mean value of cognitive engagement among girls is 3.75 ($M=3.75$).

Table 1: Independent Samples Test of Student Engagement (N=341)

	Gender	N	Mean	F	Sig.	T	Sig. (2-tailed)
SE	Male	159	3.85	0.774	0.380	1.965	0.05
	Female	182	3.70				
CE	Male	159	3.95	3.891	0.049	2.003	0.046
	Female	182	3.75				
EE	Male	159	3.70	4.403	0.037	1.563	0.119
	Female	182	3.57				
BE	Male	159	3.93	0.557	0.448	1.290	0.198
	Female	182	3.80				

Notes: **. Significant correlation at 0.01 level (2-tailed), *SE*= student engagement, *CE*=cognitive engagement; *EE*= emotional engagement; *BE*=behavioral engagement.

The results of the Independent Samples Test of student engagement are shown in Table 2. It shows that there are no big differences in student academic achievement between boys and girls ($p=0.508$). It indicates that gender did not significantly influence student academic achievement among middle school students in Qingdao China.

Table 2: Independent Samples Test of Academic Achievement (N=341)

	Gender	N	Mean	F	Sig.	T	Sig. (2-tailed)
SAA	Male	159	3.89	0.042	0.837	0.663	0.508
	Female	182	3.81				

Notes: **. Significant correlation at 0.01 level (2-tailed), *SA* = Student Achievement

Discussion

To answer the research questions whether student gender is a factor to influence student engagement and academic achievement. T test has been used to answer the questions. The findings in this study indicate that overall, gender is not a significant indicator for student engagement and academic achievement in middle school students in China.

The results of this study seem to support the theory held by some social psychologists, which states that there are more similarities than differences between the two genders (Kheloui et al., 2023). The results are also similar to research by Abulela and Bart (2021) who confirmed that gender is not a conditional factor in student engagement. In addition, a recent study conducted by Francis et al. (2023) showed that there was no significant difference in academic achievement between male and female students in senior high school. This

consistency suggests that boys and girls do not differ in their overall engagement performance. However, the result is different from some other studies. A gender gap was found in some previous literature. Marcenaro–Gutierrez et al. (2018) found that boys were more likely than girls to score low in a study conducted for 4th years of secondary education in Australia. During covid period, Korlat et al. (2021) found that girls had better academic engagement in digital learning than boys.

Meanwhile, Li et al. (2024) acknowledged that in English learning class, the differences in learning engagement were found. It showed gender stereotypes which traditionally thought female dominance in language learning indirectly impact student engagement. Specifically, this female stereotype positively influences their beliefs about language learning competence, interest and engagement, and negatively correlated with learning anxiety, meanwhile males showed opposite (Li et al., 2024).

These inconsistent results suggest, firstly, sex differences which is biologically based distinction between men and women is not a significant factor in the differences in student academic performance, but rather that such differences may be related to social and cultural factors. Previous studies have not differentiated between gender which is based on culture construct and sex which is defined biologically (Pryzgoda & Chrisler, 2000), but more often used them interchangeably, which may be a contributing factor to the inconsistent results. Besides, there are some following potential social reasons related to that.

One explanation for the difference results is different study context. China's rapid economic development has led to a dramatic shift in the structure of the labor market, with more women participating in the labor market. According to Marcenaro–Gutierrez et al. (2018), mothers participating in the labor market can break the traditional "male-dominated" roles to some extent and pass on this attitude to their daughters, which results in narrowing the gap between girls' and boys' performance in school. In the Chinese context, the female employment ratio in China in 2022 is 43.2%.

This is almost half of the total employment ratio, according to statistics from the National Bureau of Statistics of China (2023), which implies that the high proportion of women who are currently employed in China can reduce the gender gap in school learning. Then, in this current study, it was specifically demonstrated that gender did not have an impact on student engagement and academic achievement. Additionally, several historic changes in China have led to significant changes in women's roles and rights to education, which have brought the gap between women's academic performance and men's to a more even balance and even greater prominence than that of men. For instance, half of all scholars (50.32%) in China are female (Tang & Horta, 2021). Moreover, in China's higher education system, more than 40% of female students are enrolled in doctoral programs, and women account for more than 50% of undergraduate students based on MOE (2018). It is easy to see from the data that there has been a huge shift in educational opportunities for Chinese female, and that there is almost parity in the number of male and female, all of which predicts that there is not much difference between male and female students in terms of their academic engagement and performance.

Another explanation is the narrowing of the gap of schooling in gender stereotypes in China. Gender stereotyping has the potential to translate into learning outcomes (Li et al., 2024). Because it affects students' attitudes, motivation, and ultimately their participation and performance in learning (Kutuk, 2023). A detailed embodiment of this study also echoes the impact of this stereotype, which shows there is a significant difference in cognitive engagement between male students and female students though the differences of overall

student are not obvious. In China, it is commonly believed that girls' cognitive development is weaker than boys' by the middle school stage, and that their cognitive engagement decreases at this stage due to biological sex differences, and this view is also prevalent among teachers and parents.

Thus, gender stereotypes may have a differential impact on student engagement and academic achievement. Traditional Chinese Confucianism believes that women do not perform and develop academically as prominently as men. However, several major historical changes in China are also changing the stereotypical image of females in terms of academic performance. Firstly, starting from the May 4th Cultural Movement, China advocated equality between men and women, which promoted women's education; secondly, with the founding of New China, Chinese leaders forced social change, empowering women and improving women's status in society; and then the new phase of China's reform and opening up brought about great changes in various fields, including academia, which greatly increased women's opportunities to participate in academics and thus positively affected women's performance in learning (Tang & Horta, 2021). These shifts have, to some extent, changed the stereotypical impact of gender, narrowed gender bias and promoted gender equality.

Another potential explanation for no bias in student academic achievement is that test scores in different subjects are used as measures to assess students' academic achievement in different research studies. Previous literature suggests that gender effects vary in terms of different subjects (Leaper, 2015). In this study, the researchers took the average scores in Chinese, English, and Mathematics as a measure of academic achievement, which combines linguistic and spatial abilities that refer to reading, writing, and reasoning. Thus, the combined metric may average student learning outcomes.

In sum, gender differences may lead to different learning performance, especially in different social contexts. The present study shows that gender does not significantly affect student participation and academic performance at the secondary school level in China. This difference may be due to a number of reasons. In this study, the researcher analyzes the findings of this study from the perspective of the impact of China's economic development, culture, and policy changes on gender differences. In short, the objective results presented and analyzed in this study contribute to gender equity in education. As mentioned before, the concept of gender equality does not imply that men and women are the same; rather, it acknowledges the diversity of the various groups of men and women and to make sure men and women have equal rights, responsibilities, and opportunities which are not dependent on their gender (Canton, 2021). It is also important to realize that gender differences are not the problem, but that gender inequality and gender bias due to gender differences are the cause of the problem. To promote gender equity in education, schools, teachers should first avoid gender bias. The results of this study indicate that culturally and institutionally influenced transformations of gender differences are highly likely to promote equity in education.

Conclusion

As an important goal of sustainable development, gender equity in education is a topic that has been a topic of continuous attention. Yet actual gender inequity and gender bias are also persistent. The purpose of this study was to analyze whether gender has an impact on student engagement and academic achievement. The results showed that gender differences did not have a significant impact on student participation and academic achievement in a Chinese context. This result challenges the belief that gender differences lead to different learning performance. The researcher analyzes the reasons for the different outcomes in the context of China's cultural and institutional climate that promotes gender equity, and also

discusses the possibility of narrowing the gender gap that may result from the transformation of women's roles as a result of China's rapid economic development. The findings and analysis of this study will shed light on gender equity in education. Firstly, Gender differences in students do not necessarily differ in academic performance. Second, this study in China predicts that cultural and social contexts that advocate for gender equity have the possibility minimize gender differences in students' academic performance, which implies that to promote equity in education, the concept of gender equity among teachers, parents, and students is crucial.

Recommendations are suggested based on the limitations acknowledged in this study. Firstly, the data is based on student self-report questionnaires, which may result in some bias for the research result. Future studies are recommended to consider response from other stakeholders such as teachers and school leaders. Then, the study used quantitative method to do the analysis, and research data is collected on a one-time basis, thus, whether the insignificant impact of gender differences on student engagement and learning performance is persistent is yet to be identified. So longitudinal research methods are suggested in future studies.

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