Acknowledging Gender Roles, Teacher-student Interaction, and Efficacy when Studying Academic Achievement

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Abstract

This article looks at the relationship between gender and academic performance in students of secondary school at a private Salvadoran bilingual school. Studies and literature on academic achievement, stereotypes, and self-efficacy in education suggest that there is a persistent trend of female students outperforming male students in a majority of subjects. This paper explores self-efficacy characteristics and classroom dynamics which may have influenced female and male students differently in regards to their levels of academic achievement. Data collected from 284 surveys and average grades were analyzed applying two statistical tests: t-test and ANOVA to discover significant differences between boys' and girls' results. In addition, classroom observations allowed us to quantify the number and quality of teacher-student interactions happening in the school. Results revealed the following: (1) girls achieved higher grades than boys in all three courses and grade levels studied; (2) gender had an impact in both final Science and English grade averages; and (3), overall, self-efficacy revealed not to have an impact on academic achievement.

Keywords: Academic achievement, Achievement Gap, Gender roles, Self-efficacy, Teacher-student interaction

Resumen

La presente investigación analiza la relación entre el género y el rendimiento académico en estudiantes de secundaria de una escuela salvadoreña bilingüe privada. Estudios y literatura previa sobre logros académicos, estereotipos y autoeficacia en la educación sugieren que existe una tendencia en la cual los estudiantes del género femenino superan a los estudiantes del género masculino en la mayoría de las asignaturas cursadas. Este artículo explora las características de autoeficacia y la dinámica del aula que pueden haber influenciado a estudiantes de ambos sexos de manera diferente en lo que respecta a sus niveles de rendimiento académico. Los datos recopilados de 284 encuestas y calificaciones promedio se analizaron aplicando dos pruebas estadísticas: prueba t y ANOVA para descubrir diferencias significativas entre los resultados de los estudiantes. Además, las observaciones de las dinámicas dentro del aula permitieron cuantificar el número y la calidad de las interacciones profesor-alumno que ocurren en la escuela. Los resultados revelaron lo siguiente: (1) las niñas alcanzaron calificaciones más altas que los niños en los tres cursos y niveles de grado estudiados; (2) el género tuvo un impacto tanto en los promedios finales de ciencias como en los de inglés; y (3), en general, se demostró que la autoeficacia no tiene ningún impacto en el rendimiento académico.

Palabras clave: Logro académico, diferencia de logros, roles de género, autoeficacia, interacción profesor-alumno

Introduction

Over the last decades, much has been debated regarding schools being systems that favor male students over female students. In the early 1990s, the American Association of University Women published a report in which they assured that schools treated girls unfairly, bringing forth topics such as gender bias and equity for girls. However, the conversation has changed over time, with publications like “The War Against Boys” by Christina Hoff Sommers (2000), aiding in shifting the previous rhetoric, questioning whether gender bias in schools has actually hurt male students as opposed to having favored them.

What is evident, though, is that far from being shortchanged by boys, girls are achieving higher attainment levels than ever anticipated. In 2017, in the United States alone, out of 16.8 million students enrolled in undergraduate degree programs, 56% were females (NCES, 2018). Likewise, reports conducted by the World Economic Forum (WEF) have proven this is not just a trend within the United States. Women have been outnumbering men in tertiary education institutions in countries such as Panama, Argentina, Sri Lanka, Tunisia, and Iceland, just to name a few (WEF, 2015).

Simultaneously, initiatives like the Program for International Student Assessment (PISA) have made the gender gap in academia even more evident. Their most recent results for the 2018 examinations, once again, shone light on education systems which have allowed access to unequal opportunities for their students. While countries and economies that undergo these examinations are mostly preoccupied with how they rank globally when compared to other nations, more concerning is the clear gender gap in the scores achieved by 15-year olds worldwide, which has been apparent in PISA results since 2009 (OECD, 2019). In their latest publication, girls had outperformed boys in reading and science, while the opposite occurred in mathematics (OECD, 2019). This is particularly troublesome because in traditional school settings where the curriculum is still divided between text-based subjects and non-text-based subjects, this gender gap could imply overall higher scores for female students in the majority of subjects, if not all.

While a series of different factors, such as a child's immediate environment, socio-economic factors, and homelife among others have an impact on academic achievement, it is equally important to explore possible gender biases and classroom dynamics at a Salvadoran bilingual school which might also prove to be influential.

Literature Review

The gender gap in academic achievement

The Early Childhood Longitudinal Study, ECLS, is a program comprised of four different studies aimed at evaluating “child development, school readiness, and early school experiences” (National Center for Education Statistics, n.d). The birth cohort of such study, Early Childhood Longitudinal Study Birth Cohort (ECLS-B), is a sample of children representing approximately four million children born in the United States in 2001. The ECLS-B was designed to provide insight on its experiences leading up to and including entry to kindergarten. Results showed that levels of skills and knowledge upon entry, specifically reading and mathematical abilities, varied according to race or ethnicity, family type, economic status, primary home language, and whether the child had had access to any prior care and education, but *not*[1] by gender (Denton Flanagan & McPhee, 2009). In other words, children born in the United States in 2001 did not enter kindergarten with different skills and abilities based on their gender, suggesting that female and male students who come from similar socio-economic backgrounds begin their educational endeavors with the same abilities to succeed in reading and mathematical tasks, regardless of their gender.

Even though early schooling begins with the same cognitive skills, we can observe a worldwide gap in the academic performance achieved by students based on their gender. According to the most recent report by the Program for International Student Assessment (PISA) published in 2019 by the Organization for Economic Cooperation and Development (OECD),

[1] Emphasis added.

girls outperform boys significantly. PISA examines students' reading, mathematics and science skills, and what they can do with them (OECD, 2019).

Across the OECD countries who participated in PISA 2018, girls significantly outperformed boys. Just in reading, girls scored 30 points higher than boys on average. The smallest differences in scoring occurred in Argentina, China, Chile, Colombia, Costa Rica, Mexico, Panama and Peru with girls scoring 20 points higher than boys; the widest gap was observed in Finland, Jordan, the Republic of North Macedonia, Qatar, Saudi Arabia and the United Arab Emirates, where girls outperformed boys by 50 points. Boys on the other hand outperformed girls in mathematics by an average of five points across participating OECD countries. Nonetheless, in the majority of participating countries, girls outperform boys in science by an average of two points (OECD, 2019). In schools where curricula design is still divided between text-based subjects and non-text-based subjects, this global trend suggests that girls will attain higher scores, in the majority of courses taken, when compared to their male counterparts.

The 2018 PISA results indicate that students succumb to academic expectations placed on them based on gender. Male students are exceeding in the area they are *meant* to, i.e. mathematics, while girls are being true to their feminine selves by becoming good readers. However, when the science portion of the evaluation is considered, the gap in points earned is much smaller. It would be valid to suppose that two gender stereotypes have found themselves at odds: girls aren't good at science, but they are good at reading, with the latter prevailing when completing the assessment. This reasoning could also allow for the strengthening of another gender-based perception: that girls are seen as *better* students by their teachers, and so they reach higher levels of academic achievement when compared to boys.

Gender bias and classroom interactions

While it may be argued that most teachers believe and attest to treating both female and male students equally in the classroom, different investigations suggest the opposite. Alice Christie (2005), from Arizona State University, completed a descriptive study with the hopes of identifying whether gender biases were being perpetuated or disallowed in her classroom. In order to conduct her research, she offered technology workshops to a total of twenty-five students enrolled in second, third, fourth, and fifth grades. Half of the participants were male and half were female. The workshops were free of charge, and enrollment was based on personal interest. Two groups were created, with group A participating for 60 hours and group B for 45 hours. A total of 750 pages of teacher-student emails were examined, alongside 100 hours of videotaped classroom dynamics.

As a result, the author of this study came across four assertions: 1) preferential treatment via email was given to male students; 2) established gender roles were perpetuated by asking female students to be classroom assistants; 3) during personal interactions, preferential treatment was once again given to boys; and 4) the teacher had different behavior expectations of her students based on gender.

An average of 8.9 messages were sent to girls and an average of 8.3 to boys, meaning both boys and girls were interacted with almost equally. However, the teacher found herself messaging boys regarding their learning three times more frequently than girls. The male subjects of this study were usually encouraged, and communication regarding their learning process was always initiated by the teacher. The electronic interaction with girls, by contrast, was initiated by the pupils themselves. “I *responded* to the girls about their learning and I *initiated* the topic with the boys” (Christie, 2005).

Furthermore, classroom footage made another gender bias evident: students were provided with very different levels of in-class support from the teacher. Boys were given additional instructions in order to help them complete tasks individually, while the teacher completed the tasks for her female students without any further guidance that would allow for independent completion of the work. Lastly, the author acknowledged that when her male students behaved accordingly, they were congratulated and praised. Girls however, were simply expected to be intelligent, concentrated, and well behaved (Christie, 2005).

Christie’s preferential treatment for one gender over the other raises the concern of whether the idea of male supremacy in the classroom is learned and accepted by pupils from a very young age. Furthermore, teaching strategies within the context of this study which supported boys in completing difficult tasks while finishing them for girls, inevitably add to the perception that only males can succeed in STEM related subjects and/or careers. Lastly, praising boys for meeting behavior expectations, but not girls, most likely enhances a sentiment of invisibility and deficient ability amongst female students.

Studies have shown that differences in classroom interactions based on gender not only occur at the elementary school level, but also at the secondary school level. A study conducted in 2000 by the National Chiao Tung University in the Republic of China, assessed and analyzed the relationship between a Taiwanese teacher’s beliefs, her teaching practices, and the gender-based student-teacher interactions within her seventh-grade biology classroom.

Hsiao-Ching She (2000) interviewed the teacher twice during this study; the first interview took place prior to any observations in order to identify the teacher's beliefs on both pedagogical issues and learning characteristics based on gender. The second interview was done after the classroom observation period to recapitulate on the differences in learning styles, participation, and interaction with male and female students.

In terms of the teacher's educational and pedagogical beliefs, the study evidenced a desire to strengthen "students' higher-order thinking, learning, problem-solving, and decision-making skills" (She, 2000). Despite this desire, the interview process also showed the teacher believed boys were able to grasp scientific concepts at a much higher speed than girls, which was also confirmed later during the observations.

The observation period of this study was divided into two groups: class A and class B. Boys seemed to participate in class activities more than their female counterparts. Of a total of 355 questions asked during class A, 79.7% were answered by boys, while 21.3% were answered by girls. In class B, a total of 581 questions were asked with 78.5% being answered by boys and 21.5% by girls. Similarly, in Class A, 57% of the answers were shouted out by boys, while in Class B, boys shouted out answers 60% of the time. Ultimately, 81% of feedback was given to boys in class A, while in class B boys received 77% of the feedback.

The data collected through this study showed that classroom dynamics are influenced by teaching and gender beliefs, while suggesting that characteristics attributed to students based on their gender play an important role in dictating, and therefore maintaining, the trend of male dominance within the classroom.

Over the last forty years, researchers have suggested that beliefs on efficacy determine both an individual's and a group's motivation in regards to academic achievement. Bandura (1997), for example, coined the term *self-efficacy* to explain how and why humans achieve not only academic success, but success in general. As a result, researchers Pina-Neves, Faria and Raty (2013) stated: "Self-efficacy was first defined by Bandura in the 1970s as the belief that one can produce desired results and succeed achieving aims through one's own actions" (p. 455). In other words, self-efficacy highlights what an individual believes itself to be capable of accomplishing. According to Pina-Neves et al. (2013), belief in one's self ability can be found at different levels. Figure 1 details such levels. Additionally, other researchers such as Pajares

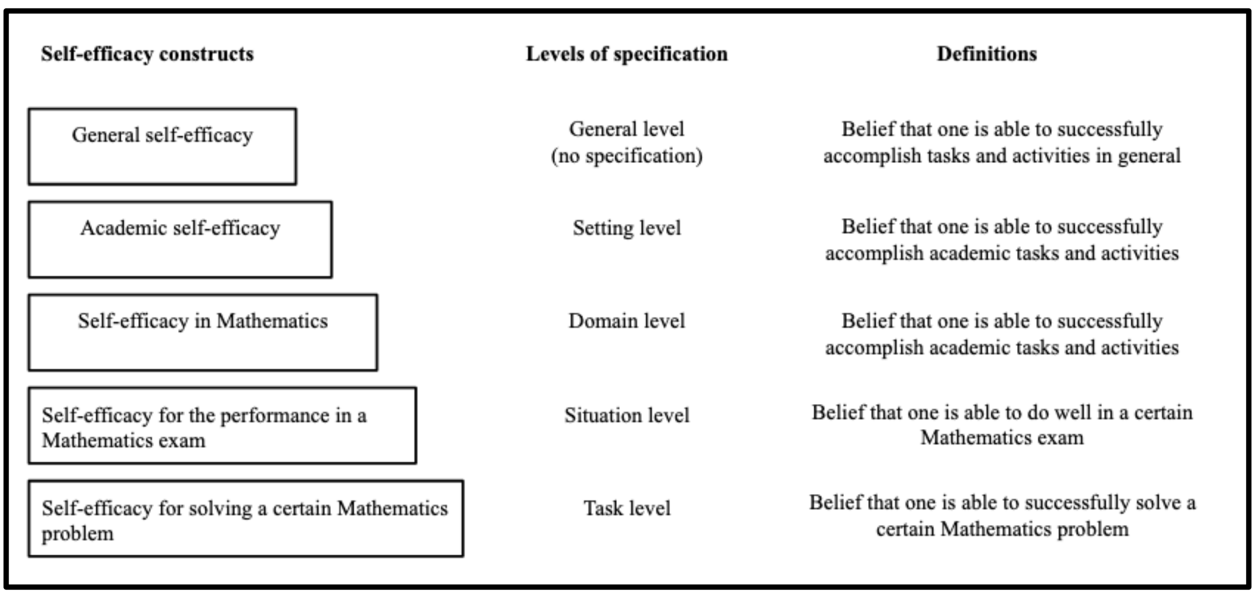

Figure 1. Levels of self-efficacy (Taken from Pina-Neves, et al. 2013)

(cited in Pina-Neves, et al., 2013), have made emphasis on the idea that self-efficacy beliefs at a more specific field or area (i.e., the domain level), like mathematics, are able to provide more insight on academic achievement than general levels of beliefs can.

While much of the literature considered has taken into account student gender and levels of self-efficacy as separate factors that have an impact on academic achievement, other authors such as Meece and Jones (1996) and Skaalvik (1990) have suggested that gender differences are already present in self-efficacy beliefs. This is most likely why boys show more confidence in tasks relating to STEM and spatial reasoning, and why girls are more confident when it comes to verbal and language-related tasks.

The literature did, however, present a study in which female students were perceived to be quite visible and engaged learners. The study was conducted in eight different schools across England and Wales, focusing solely on grade 11 students, and suggested "that growing numbers of teachers may be increasingly defining their 'ideal student' as female." (Younger, Warrington & Williams, 1999). A total of 48 focus groups with 200 students, all further divided into smaller groups of four based on gender and levels of academic ability were studied. Teaching staff participated through interviews and different classroom observations also took place. Younger et al. (1999) were concerned with explaining the relationship between teacher-student interaction in the classroom and the teaching-learning process which in turn has an impact on a student's level of attainment at the General Certificate of Secondary Education (GCSE) level.

Evidence showed that in all schools sampled, the teaching staff acknowledged academic differences among male and female students. However, they also concluded that some of these differences could stem from generalizations based on gender. For example, girls were often considered to be more organized, having stronger communication skills, and mastering independent learning. In comparison, teaching staff perceived male students as unorganized and not motivated enough to prioritize their academic work. Boys were described as being "more boisterous, less advanced for their years, more easily distracted than girls" (Younger et al., 1999).

Overall, student-teacher interaction across all four schools was dominated by male students over female ones; 54% to 46% respectively. More specific results revealed that boys were reprimanded 76% of the time, with girls accounting for 24% of the time. Further gender differentiation was also made evident through the amount of questions directed to boys versus girls: 62% of the questions were directed to males and 38% to females. Finally, expected classroom dynamic patterns were broken when it came to questions directed to teachers on behalf of their students. During whole class work sessions, 70% of the questions or requests were made by girls. In addition, 58% of the questions or requests made during individual work also came from females. It was girls who seemed to show higher levels of curiosity when it came to actual learning.

At a simple glance this study could be taken as incongruent in regards to the initial claim pinning classroom biases a factor impacting academic achievement. Yet, the results obtained by Younger et al. parallel what Christie discovered in her own study: teachers *initiate* interactions with male students, yet only *respond* to female students' requests that might further their learning experiences. So even if teachers' concepts of the ideal student have become feminized, their behavior in the classroom remains biased towards male students.

Thus, the bibliographical review revealed that the gender gap in academic achievement in STEM related subjects may be a result of females becoming invisible to male students, who garner the majority of their teachers' attention. Equally important is the concept of self-efficacy, and how a disparity in teacher-student interactions based on gender might have led girls to believe themselves carriers of low cognitive abilities when it comes to science and mathematics.

While past studies have considered and analyzed different contributing factors to the gender gap in academic achievement, such as socioeconomic status, home life conditions, school quality and placement, among others, the present study focused solely on teacher-student interactions and levels of student self-efficacy. The research conducted aimed at understanding participants' self-efficacy characteristics and classroom dynamics which may have influenced female and male students differently in regards to their levels of academic achievement in order to improve their learning experiences and help reduce the gender gap in academic achievement in the context of a Salvadoran private bilingual school.

Methodology

The study had a quantitative approach. The research originated from a desire to understand participants' characteristics and dynamics which may have influenced female and male students differently in regards to their levels of academic achievement. The quantitative approach of this study was appropriate because it allowed for the relationship between one or more variables to be measured. This relationship, once established, can be used to identify links when trying to understand a phenomenon (Robson, 2011). This research was designed as a small-scale study with a descriptive scope, as it intended to describe the patterns of relationships among the studied variables (Robson, 2011). More specifically, the study was non-experimental cross-sectional because the focus was on the relationships among variables within the group of students.

Hypotheses and Variables

Alternative Hypotheses

H1: Students with higher levels of self-efficacy garner higher academic achievement than students with lower levels of self-efficacy.

H2: Female students with higher levels of self-efficacy garner higher academic achievement than female students with lower levels of self-efficacy.

H3: Female students with higher levels of self-efficacy garner higher academic achievement than male students with lower levels of self-efficacy.

H4: Male students with higher levels of self-efficacy garner higher academic achievement than male students with lower levels of self-efficacy.

3.2.2 Null Hypotheses

$H_0$1: Students with lower levels of self-efficacy do not garner higher academic achievement than students with higher levels of self-efficacy.

$H_0$2: Female students with lower levels of self-efficacy do not garner higher academic achievement than female students with higher levels of self-efficacy.

$H_0$3: Female students with l lower levels of self-efficacy do not garner higher academic achievement than male students with higher levels of self-efficacy.

$H_0$4: Male students with lower levels of self-efficacy do not garner higher academic achievement than male students with higher levels of self-efficacy.

Independent variable.

Level of believed self-efficacy. Self-efficacy, in accordance with Bandura's (2000, 2006) work, is defined as what an individual believes itself to be capable of accomplishing.

Dependent variable.

Academic achievement. Academic achievement can be defined as the level of proficiency in scholastic work (American Psychological Association, 2018). Within the context of this study, academic achievement is the average sum of all assessments completed by participants during the first term of the academic year 2019-2020, which ran from August to December/2019.

Context and participants

This study was conducted at a Salvadoran bilingual school due to the availability of participants and the accessibility to the teaching staff. The secondary school currently consists of 632 enrolled students. A total of 284 students participated in this study. These students were non-randomly chosen by judgment as they were the students enrolled in grades seven, nine, and eleven, which were considered to be the key points in the student's educational journey: they have completed their first year in secondary school (grade 7); the midpoint in their secondary education (grade 9); and they have completed their IGCSE courses (grade 11) (Patwari, 2013).

Data sources

Data collection for this study involved three different sources of information: a student survey, classroom observations, and final term 1 grade averages for the current academic school year.

Student survey

The Pupil Attitude to Self and School (PASS) survey measures students' attitudes in relation to their academic achievements. The PASS survey was created by GL Assessment, the leading provider of formative assessments to the UK and British bilingual international schools (GL Assessment, 2017). It consists of 50 statements further categorized into nine specific factors

(See Figure 2). The measurement of these nine factors allow schools to assess the following areas: (1) learner self-regard; (2) engagement with learning experiences; and (3) impact of external contextual issues (GL Assessment, 2017). For the purpose of this study, and due to its delimitations, only those factors concerned with student sense of academic competence and engagement were taken into consideration; that is, factors two, three, four, and seven. Figure 2 provides an explanation for what each attitudinal factor measures.

Figure 2. PASS survey attitudinal factors (Adapted from GL Assessment, 2017)

2	**Perceived Learning Capability**	Offers a snapshot of a pupil's unfolding impressions of self-efficacy and can reveal early warning signs of demoralisation and disaffection
3	**Self regard**	Equivalent to self-worth, this measure is focused quite specifically on learning and shows a strong correlation with achievement.
4	**Preparedness for learning**	Highly correlated with pupils at risk of behavioural difficulties, this measure explores whether a pupil feels they have the tools in place to learn. It covers areas such as study skills, attentiveness and concentration.
7	**Confidence in learning**	Identifies a pupil's ability to persevere when faced with a challenge.

Classroom observation

Additionally, the present study considered *teacher-student interaction* as a possible factor which may be affecting the participants' academic achievement. An interaction, according to the online Merriam-Webster dictionary (2020), is a "mutual or reciprocal action or influence" between two parties. For the purposes of this study, teacher-student interaction was any communication or verbal transaction between the teacher and the student in the form of a question posed by the teacher and answered by any student.

Classroom dynamics consisted of teachers asking questions to the whole class in a plenary style, followed by individual work time. In all lessons, students answered questions in one of three ways: (1) raising their hands and being called upon; (2) shouting out the answers; or

(3) being directly called on by the teacher. Male and female students in all subjects were equally distributed for the most part, with some classes having one or two more female students. The only exception to this last point was in both English classes (grade nine and grade eleven) where only three boys were present on the days the observations took place.

In order to obtain data from classroom observations, and in an attempt to identify gender bias in teacher-student interactions, a tally sheet for classroom observations was created (see Figure 3). Based on the literature reviewed, specifically Barba and Cardinale's (1991) study, the tally sheet took into account the following variables: the gender of the participating student, the level of question being answered, whether high or low based on Bloom's taxonomy; whether answers were on or off task, regardless of the answer being correct or not; and what method was used to draw the teacher's attention, i.e. hands were raised or answers were simply shouted out. Drawing upon Barba and Cardinale's investigation on whether female students become invisible in the science and math classrooms because of a bias towards male students, the frequency count also considered what they defined as *target students*, or those students who had four or more interactions with the teacher during one class period.

Teacher-student interaction tally sheet for classroom observations

School: ______________________________ **Date:** ______________________________

Teacher gender: ______________________ **Subject:** ___________________________

STUDENT	QUESTIONS		RESPONSES		ATTRACTION	
GENDER	LOW	HIGH	ON-TASK	OFF-TASK	HANDS	OTHER

Figure 3. Teacher-student interaction tally sheet for classroom observations

Results

Results from the statistical t-test are shown in the following chart. In all three subjects and final average, there is a mean difference favoring female students. The differences in average scores are as follows: English .37; Mathematics .22; Science .28; and in general average scores (the sum of all three subjects) .28. The group statistics also show us the differences in terms of the PASS survey scores. In capability, there is a mean difference of .44; a .81 difference in terms of learner's self-regard; a 4.44 difference in preparedness; a 2.04 difference in confidence; and a 1.89 difference in self-efficacy in general (See Table 1).

The independent samples t-test resulted in the following table chart, showing statistical significance of .000 for English, .040 for Science, and .003 in the general average (See Table 2). The independent samples t-test was further validated by the one-way ANOVA test, which can be seen in Table 3 (See Table 3).

Table 1.

Group statistics t-test.

	Gender	N	Mean	Std. Deviation	Std. Error Mean
English Grade	Male	140	5.339	.7734	.0654
	Female	144	5.712	.7036	.0586
Math Grade	Male	140	5.221	1.1833	.1000
	Female	144	5.448	.9942	.0829
Science Grade	Male	140	5.168	1.2198	.1031
	Female	144	5.455	1.1280	.0940
General Average	Male	140	5.254	.8859	.0749
	Female	144	5.540	.7358	.0613
Capability	Male	140	63.886	25.4652	2.1522
	Female	144	64.334	26.3067	2.1922
Self -regard	Male	140	44.397	28.7132	2.4267
	Female	144	43.578	28.8989	2.4082
Preparedness	Male	140	58.837	25.9539	2.1935
	Female	144	63.278	25.8252	2.1521
Confidence	Male	140	62.533	26.5390	2.2430
	Female	144	64.581	25.0480	2.0873
Self -efficacy	Male	140	57.055	20.8979	1.7662
	Female	144	58.946	1.0359	1.7530

Table 2.

Independent samples t-test.

		Test for equality of means			
		Significance	Mean difference	Std. Error Difference	95% Confidence Interval of the Difference
					Inferior
English Grade	Equal variances assumed	*.000	-.3725	.0877	-.5451
	Equal variances not assumed	*.000	-.3725	.0878	-.5454
Math Grade	Equal variances assumed	.082	-.2265	.1296	-.4815
	Equal variances not assumed	.082	-.2265	.1299	-.4822
Science Grade	Equal variances assumed	*.040	-.2870	.1394	-.5613
	Equal variances not assumed	.041	-.2870	.1395	-.5616
General Average	Equal variances assumed	*.003	-.2853	.0965	-.4753
	Equal variances not assumed	*.003	-.2853	.0968	-.4758
Capability	Equal variances assumed	.884	-.4483	3.0735	-6.4983
	Equal variances not assumed	.884	-.4483	3.0721	-6.4955
Self-regard	Equal variances assumed	.811	.8187	3.4192	-5.9116
	Equal variances not assumed	.811	.8187	3.4189	-5.9110
Preparedness	Equal variances assumed	.149	-4.4413	3.0727	-10.4897
	Equal variances not assumed	.149	-4.4413	3.0729	-10.4902
Confidence	Equal variances assumed	.504	-2.0484	3.0615	-8.0746
	Equal variances not assumed	.504	-2.0484	3.0640	-8.0797

Self-efficacy	Equal variances assumed	.448	-1.8908	2.4887	-6.7896
	Equal variances not assumed	.448	-1.8908	2.4885	-6.7892

Note: * Significance at the level of $p < .05$ (one tail test).

For a result to be considered statistically significant, the Standard Deviation must be less than .05

Table 3.

One-way ANOVA table

		Sum of Squares	df	Mean Square	F	Sig.
General Average	Between Groups	5.778	1	5.778	8.736	*.003
	Within Groups	186.512	282	.661		
	Total	192.290	283			
Self-efficacy	Between Groups	253.792	1	253.792	.577	.448
	Within Groups	123983.184	282	439.657		
	Total	124236.976	283			

Note: * Significance at the level of p <.05.

This significance seem to indicate that final academic achievements for both English and Science seem to be influenced by gender, yet not by levels of perceived self-efficacy, unlike the predictions made by our original hypothesis.

H1: Students with higher levels of self-efficacy garner higher academic achievement than students with lower levels of self-efficacy.

Results indicate that that level of perceived self-efficacy was not associated with higher academic achievement. Therefore, the null hypothesis is accepted.

H2: Female students with higher levels of self-efficacy garner higher academic achievement than female students with lower levels of self-efficacy.

H3: Female students with higher levels of self-efficacy garner higher academic achievement than male students with lower levels of self-efficacy.

H4: Male students with higher levels of self-efficacy garner higher academic achievement than male students with lower levels of self-efficacy.

Regarding hypotheses two, three, and four in which gender was considered as a predicting factor associated with self-efficacy and academic achievement, the results indicate again that, self-efficacy was not associated with higher academic achievement. Therefore, the corresponding null hypotheses were accepted.

Although the independent variable self-efficacy as a whole seems not relevant when it comes to predicting academic achievements of male and female students, there are two factors within it that could: factor 3 - learner self-regard and factor 4 - preparedness for learning. This was evident through a univariate analysis which allowed to identify *p* value was of .000 and .003 respectively and .003 for gender (See Table 4).

Table 4.

Univariate analysis of self-efficacy factors.

Test of Between-Subjects Effects					
Dependent Variable: General Average					
Source	Type III Sum of Squares	df	Mean Square	F	Partial Eta. Squared
Corrected model	38.680[a]	6	6.447	11.625	.000
Intersection	669.560	1	669.560	1207.398	.000
F2 Perceived Learning Capability	.232	1	.232	.418	.518
F3 Learner Self Regard	9.558	1	9.558	17.235	*.000
F4 Preparedness for Learning	4.874	1	4.874	8.789	*.003
F7 Confidence in Learning	.011	1	.011	.020	.888

PASS Average	.588	1	.588	1.061	.304
Gender	5.143	1	5.143	9.274	*.003
Error	153.610	277	.555		
Total	8470.490	284			
Corrected Total	192.290	283			

Note: * Significance at the level of $p < .05$.

Teacher-student interaction

As an additional factor, teacher-student interactions within the classroom were measured in an attempt to identify gender biases ingrained in classroom dynamics. These interactions consisted of questions being posed by the teachers and answered by any of the students. Table 5 shows the results of the observations, separated by grade level, subject, and gender. Overall, it is clear that female students accounted for the majority of teacher-student interactions; 46% of all interaction counts (IC) were completed by male students in all three grades, the remaining 54% by female students. Similarly, 43% of low-level questions (LQ) across all three grade levels were answered by boys and 57% by girls. In regards to high-level questions (HQ), all three grade levels and subjects show different trends. Overall, male students answered 51% of all HQ, with females answering a total of 49%. In grade seven Math, there was an equal amount of HQ answered by both genders, while the difference in Science is of 75% males and 25% females. Grade nine Math however, shows a large difference between genders, with 67% of high-level questions answered by boys and only 33% by females. Science and English for this same grade level were quite similar; 33% males and 67% females in Science, and 31% of males and 69% of females in English. While grade eleven Science also showed an equal amount of HQ answered by both genders, differences in HQ percentages in English showed boys answering 58% of the questions and girls answering 42%.

Discussion

Key findings that emerged at the end of this study were: (1) girls achieved higher grades than boys in all three courses and grade levels studied; (2) gender had an impact in both the final Science and English grade averages; and (3), overall, self-efficacy was proven to not have an impact whatsoever on academic achievement.

Final grade averages

Higher general scores on behalf of girls in both Science and English are consistent with the most recent PISA results, where girls outperformed boys by 2 and 30 points, respectively. In Mathematics, however, and predicted otherwise by the literature, girls in all three grade levels also achieved higher final scores than their male counterparts. This is an important finding in the understanding of how gender relates to these subject areas around the world. El Salvador is not part of the OECD countries that undergo the PISA examinations, yet students in this study seem to not only have fallen in line with the discussed gender trend, but have also marked their own in relation to one subject. These findings further validate Baker's (1987) claim that indeed male and female students are being exposed to different learning experiences in spite of being inside the same classrooms. The unquestionable gender gap in academic achievement sparks questions about the teaching-learning experiences currently happening at the school, and whether students are in fact, receiving equal support in order for them to succeed in their academic ventures. It also gives way to the possibility that if male students are being steered towards answering high-level questions, they might no longer be paying attention during low-level questions directed at female students, further deepening the achievement gap.

Gender and self-efficacy

While the independent samples t-test confirmed that final academic achievements in both Science and English are influenced by gender, results also indicated that levels of perceived self-efficacy were not associated with academic achievement. This contradicts Meece and Jones' (1996) and Skaalvik's (1990) review of Bandura's (1997) work on self-efficacy. Unlike claims made by such authors, perceptions of self-efficacy at a general level had no impact on a student's final grades. However, when looking at the more specific factors of the PASS Survey, further analysis proved factors three - learner self-regard -, and four - preparedness for learning - are indeed relevant when predicting or determining student academic achievement (See Table 4). According to Pina-Neves et al. (2013), both of these factors can be further categorized as Academic self-efficacy, which takes place at a setting level (See Figure 1). It could be inferred that factors three and four take place at a more specific level within a student's psyche and thus, have a more pressing impact on their overall academic achievements than general beliefs of self-efficacy can.

Classroom observations of teacher-student interaction

Classroom dynamics in the grade seven Mathematics lesson conformed to much of the arguments and findings published by Younger et al. (1999). Girls, on the one hand, had lower levels of teacher-student interactions, and struggled to get going with their individual work. This was evidenced by the higher number of inquiring questions on behalf of students towards the teacher being asked by girls during the initial stages of the individual work, within the next five minutes or so after the teacher had explained the task and commanded the students to begin working. It seemed female students needed much reassurance and validation as they initiated the task. Boys, on the other hand, were confident, accounted for most of the teacher-student interactions, and when it came to individual work, got on with it. Much in accordance with Younger et al. (1999), boys only interacted with the teacher when prompted; the few inquiries made by them happened about 10 minutes into the task, when they were at odds in relation to a specific problem or exercise.

Observations for grade nine Mathematics were similar to those in grade seven. Once again males accounted for the majority of interaction counts, answering most of the high-level questions. Throughout this class period, boys were much more talkative; the teacher had to call on their behavior a few times. Equally, males were very confident when answering questions, usually shouting them out, not even waiting to be called on. Conversely, girls, like much of the literature suggested, conformed to expected classroom behavior, only answering questions after having been called on (Barba & Cardinale, 1991). Much like the grade seven Mathematics class, the majority of inquiring questions on behalf of the students towards the teacher were mainly asked by girls, this time during the entirety of individual work time.

In the grade seven Science class, girls were highly engaged and enthusiastic during teacher-student interactions. It is important to note that this lesson was the only lesson where all students raised their hands before answering any questions at all. Even though female students did not answer as many high-level questions as the boys did, they were constantly raising their hands, eager to participate. In that sense, girls seemed much more confident than boys when it came to not only the subject, but also the task at hand. Although much of the questions during this session involved recalling information, with few questions prompting student analysis and critical thinking, it was female students who dominated the classroom dynamic, answering most of the questions asked. Nonetheless, an inference can be made in which a bias towards male students was evident, as it was them who were chosen to answer the majority of the high-level questions.

In regards to grade nine Science, classroom dynamics resembled those of the grade seven classroom. Females accounted for most of the total teacher-student interaction count, with them answering the majority of the high-level questions. Much like the grade seven girls, grade nine girls were confident, eager to participate, and answer questions. Female students were once again on task throughout this lesson, with many of the boys called on for not meeting behavior expectations.

While classroom dynamics for grades seven and nine Science were very similar, that wasn’t the case for grade eleven. Male students accounted for the majority of teacher-student interaction counts, and although boys and girls answered an equal amount of high-level questions, girls only participated when called upon. For the majority of the class period, girls in this class were almost invisible, as suggested by Barba & Cardinale (1991) in the literature reviewed. With the exception of one girl who constantly participated, classroom dynamics were dominated by male students. It is important to clarify though, that while female students might have seemed unengaged with whole group discussions, they were constantly annotating in their books and work booklets; girls were very much focused on completing the assigned tasks.

Based on these results, both mathematics and science teachers could encourage a growth mindset with the students, allowing them to believe that being good at STEM related subjects is something that they can further develop and strengthen, as opposed to it being something inherent to their gender. At the same time, by having teachers focus on praising characteristics such as risk-taking, curiosity, resilience, and hard work, can help students stray away from the perception that one gender might be better than the other when it comes to grasping concepts within these types of subjects.

Due to the fact that there were more female students than male students, it was expected that both grade nine and grade eleven girls would account for the majority of interaction counts in English class. However, that was only the case in grade nine, where it was the girls who had the highest IC and answered the majority of HQ.

In contrast, in grade eleven, in spite of there only being three males enrolled in the class, most of the IC and of the HQ were completed by males. It is relevant to point out, though, that the majority of male participation was carried out by one single student. Out of the three boys in the class, this particular student was engaged, actively discussing with his classmates and teacher. At the same time, even if female participation was lower, they didn't trail behind by a large difference, neither in participation nor in amount of high-level questions answered. In fact, it was the girls who engaged the most during group work, prompting discussion among their peers, revising each other's work, and making suggestions here and there. The remaining boys were unfocused and engaged only when the teacher called them out.

Therefore, boys were prompted with further questions most of the time during whole group discussions, meaning, responses provided by male students were validated and challenged by the teacher, to the point where they were always asked to elaborate further. Perhaps this was done with the intention of encouraging more male participation in a class where it seemed boys were drowned out by larger amounts of females. However, when it came to female responses being validated, they were only done so by using phrases such as "I can see why you'd think that", but with no further encouragement for discussion.

The observed teacher-student interactions in this subject seem to indicate that teachers follow a pattern of validating male participation over female participation. In that sense, it would be best for teachers to actively try alternating between genders when conducting classroom dynamics which involve discussion, while also ensuring a follow up question for each. This would allow for more equity in regards to teacher-student interaction in the classroom, not only in regards to participation, but in regards to question type as well.

The observed classroom dynamics for grades seven and nine revealed that gender may have influenced girls in terms of how they see themselves within the context of the subjects and classrooms at hand. By asking more questions in subjects like Mathematics and Science, it could be said that they consider themselves somewhat deficient in the skills needed to successfully complete assigned tasks. Contrary to boys, who seem to fit well with stereotypical notions that they are already good at STEM related subjects, thus not requiring help initially, only as the exercises become more difficult or involve new concepts.

Nonetheless, because girls ask for more help, it can be inferred that in the long run, they have reached higher levels of understanding. By making sure they are properly completing tasks, girls are reflecting on what they are being taught, allowing them to fill in any knowledge or comprehension gaps almost immediately, providing them with a stronger grasp on content when it comes to assessments. Inevitably, this has enhanced their revision skills, which in the end might account for the higher grades they achieve in all subjects, not just STEM related ones.

Even in grade eleven, where female participation in Science and English was lower, girls were still seen honing their revision and note-taking skills throughout their time in class. By the time female students get to the higher grades, they might have already encountered years of biased classroom dynamics and so they begin to retrieve from the spotlight, as to not have to compete with male dominance. In the process of doing so, it seems they have managed to develop strong independent-learner skills and so continue to reach higher levels of academic achievement.

Conclusions

The findings of this study show that students are clearly aware of their gender, and although it seems that boys are happy conforming to such roles, girls have, unconsciously or not, been working past the generalized expectations placed upon them, which for long have been encouraging them to fall short of male achievements. It is also evident that girls at the school have strengthened their academic skills and boys haven't, relying on confidence and dominance of the classroom to reach passing scores. Strengthening academic skills for boys could have a positive effect on their learner self-regard and whether they consider themselves prepared for learning or not, impacting their levels of academic achievement and thus, reducing the current gender gap.

In a world which continues to place a strong emphasis on scores and how they relate to success, achieving equity in education is important, making sure that all stakeholders have the same minimum of academic skills in order to reach their academic potential.

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