
| RESEARCH ARTICLE

Students' Perceived Academic Self-Efficacy by Gender and Subject Domain

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| ABSTRACT

The aim of this study is to test for possible gender variations in student perceived self-efficacy across six subject areas. More specifically, it examines whether students would rate their perceived self-efficacy in stereotypically male-dominated and female-dominated academic subject domains with respect to the gender variable. A self-designed questionnaire was employed to collect data from 367 high school students in different Moroccan public high schools. The data were then analyzed using Principal component analysis to identify the factors that contribute to the variance. T-tests were used to account for possible gender differences in students' perceived academic self-efficacy. The results revealed that male students displayed higher self-efficacy scores in mathematics and sciences while female students showed higher self-efficacy scores in languages. This might reinforce the stereotypical belief that males and females are better in masculine and feminine subjects, respectively. Unexpectedly, female students exhibited higher scores than males in philosophy and in the perceived overall academic self-efficacy. Recommendations for educational practice are discussed.

| KEYWORDS

Self-efficacy, gender stereotypes, masculine subjects, feminine subjects.

| ARTICLE INFORMATION

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1. Introduction

Self-efficacy is a psychological construct that focuses on a person's belief in his or her ability to perform a particular task or engage in a specific behavior (Bandura, 1977, 1982, and 1986). Self-efficacy beliefs are self-perceptions of competence that have an impact on how students feel, think, and behave in prospective situations. Bandura also proposed that self-efficacy beliefs might be affected by a variety of factors, including past experience (completing successfully a similar task in the past), social role modeling (observing and imitating others who successfully complete a task), and verbal persuasion (receiving positive feedback). He added that a person's behavior toward a challenging endeavor is determined by his or her level of self-efficacy. For instance, people with higher levels of self-efficacy approach difficult tasks or activities as challenges to be met rather than threats to be avoided. They work harder and remain steadfastly committed to achieving difficult goals. Failure is primarily seen as the result of inadequate effort or a lack of knowledge and abilities, both of which can be learned, developed, and improved. In contrast, people with low self-efficacy beliefs tend to be less confident in their own abilities and avoid difficult tasks because they consider them as personal threats to be avoided rather than challenges to be undertaken. They show less dedication to achieving their objectives and persevering with impending activities that they believe to be challenging or beyond their degree of competence.

Self-efficacy is not only restricted to the accomplishment of a given task, but the concept can also be extended to include people's confidence in their abilities to perform well in a particular academic subject. In a review of the literature on the relationship between self-efficacy and academic performance, Pajares and Miller (1995) found that self-efficacy is a key predictor of student academic achievement across different subject areas, including math, science, and language arts. They found that students with higher self-

efficacy tend to work harder, set higher goals, earn higher grades, and are more likely to take advanced courses in their subject areas since their strong self-belief will undoubtedly encourage them to persevere and achieve better levels of behavioral performance. In fact, the review by Pajares and Miller indicates that self-efficacy beliefs affect student achievement and that making an effort to do so may be a useful method to enhance performance in a variety of contexts.

2. Literature review

In recently published research, significant gender variations in self-efficacy beliefs were observed at the level of the investigated subject domains. In this context, mathematics and science-related academic areas have long been stereotyped as male-dominated subject domains (Fennema & Sherman, 1977), whereas languages and arts have been stereotyped as female-dominated academic fields (Marsh, 1989; Parson, Meece, Adler, & Kaczala, 1982; Skaalvik & Rankin, 1994). In addition, age has been found as a powerful predictor of gender differences in self-efficacy beliefs. For instance, Wigfield and his colleagues (1996) found that both boys and girls exhibit comparable confidence in their mathematical abilities, especially in the early years; however, by middle school, boys start to show higher mathematical self-efficacy, which is attributed to their increased concern to conform to gender role stereotypes (Wigfield et al. 1996).

2.1 Gender differences in self-efficacy beliefs with respect to math and sciences

Pajares (2005) summarized the findings of research on gender differences in math self-efficacy in a review of studies and found that these differences start in middle school and tend to increase in high school and college. In this context, male students were discovered to have better mathematical self-efficacy than female students, even in situations where both of them score at similar rates or even when female students exceed their male counterparts. The author attributed these discrepancies to gender stereotypic beliefs about gender rather than to gender. Accordingly, holding a masculine instrumental orientation or a feminine expressive orientation is associated respectively with confidence and success in male-dominated areas such as mathematics and science or female-oriented areas such as writing-related tasks. Moreover, Huang (2013) provided a summary of the literature on the issue of gender differences in academic self-efficacy in a meta-analysis that included more than 200 independent studies. He found that male students scored slightly higher overall than female students in terms of their sense of academic efficacy. He also found that the subject matter or content domain was a moderator that had a substantial impact on the difference in academic self-efficacy between boys and girls. As a result, it was discovered that female students had higher levels of self-efficacy in language-related subjects, whereas male students had higher levels of self-efficacy in subjects like mathematics, computing, and sciences. Findings also revealed that parents and teachers might convey stereotypical messages in a subtle way, which could lower females' confidence and achievement in male-dominated disciplines, including mathematics and science.

However, in another meta-analysis, Hyde and her colleagues (1990) reported results of studies on gender differences in attitudes and affect specific to mathematics and came to the conclusion that these differences are small. Therefore, gender disparities in mathematical performance and involvement are not significantly influenced by affect (mathematics anxiety and self-confidence) or attitudes. On the other hand, the stereotyping of mathematics as a male subject domain, especially from the part of male students, may be considered a critical factor in females' willingness to succeed in this male-dominated subject. The authors also argued that despite the slight gender variations in attitudes and affect in mathematics, female students consistently exhibit more negative attitudes the fact that indicates a pervasive belief (enhanced by social agents such as male peers, parents, and teachers) that might affect females from taking mathematics courses or choosing mathematics-related careers.

2.2 Gender differences in self-efficacy beliefs with respect to language-related subjects

In the context of language-related fields, research has consistently found that female students have firmer self-efficacy beliefs than male students in these traditionally feminine subjects (e.g. Huang, 2013). For example, in a quantitative study and in an Indonesian context, Anam and Susanto (2017) found that students' self-efficacy in English was affected by gender. The results indicated that female students' self-efficacy was stronger than that of male students since females perceived themselves as more capable of doing language tasks and regulating their own learning than boys did. Zhu and Gong (2020) found that Chinese female university students hold higher overall self-efficacy beliefs in English than males. Mills et al. (2007) studied the role and the effect of self-efficacy beliefs of college French students on language learning outcomes and found that despite the fact that both male and female students had comparable performance levels, female students exhibited higher self-efficacy for self-regulatory skills in learning about the French language and its culture than did male students.

In the Moroccan context, however, research on academic self-efficacy beliefs is limited, and more studies are needed to better understand the complex relationship between gender and self-efficacy beliefs in different subject areas. As for gender disparities in language self-efficacy, findings were somehow inconsistent. For example, Zaid (2020) investigated the relationship between self-efficacy, performance, and motivation of Moroccan English foreign language university students and discovered a substantial correlation between these variables; however, no significant gender differences were depicted at the level of students' self-efficacy beliefs. Furthermore, along the same lines, Omari, Moubtassime, and Riddouani (2020) observed no statistically important variations between male and female students' language self-efficacy beliefs in a sample of 365 undergraduate university students.

Conversely, in a more recent study, Bouih, Nadif, and Benattabou (2021) found that female EFL university students across different regions in Morocco reported higher self-efficacy beliefs than their male counterparts.

2.3 Gender differences in self-efficacy beliefs with respect to philosophy

Initially, it is significant to mention that women are underrepresented in academic philosophy on different professional levels. For example, Paxton et al. (2012) analyzed an existing gender disparity in philosophy at distinct professional levels and found that there was a statistically important dropout rate for women in philosophy at the bachelor's level in the United States. Similarly, Thompson et al. (2016) discovered that women drop out of philosophy after taking just a few classes. Barron et al. (2015) found significant gender disparities in existing attitudes toward philosophy, which accounted for female underrepresentation in philosophy in an Australian context. However, studies on gender self-efficacy beliefs for philosophy are lacking in Morocco as a non-western country.

Thompson (2017) attributed the underrepresentation of women in philosophy at the student level to multiple mechanisms or hypotheses. The first mechanism relates to discrimination and unfavorable treatment women may face from their teachers or other students. A second hypothesis refers to gender differences in abilities in science and mathematics, and philosophy is a subject that relies on rational reasoning, abstract thinking and logic, which are also used in mathematics and sciences. A third hypothesis relates to gender schemas that people unconsciously employ to store information about the world. For example, associating philosophy with masculinity might curtail female students' interest in the field because of the conception that most philosophers, historically speaking, are males, in addition to the absence of female role models in philosophy either because of the relative absence of female instructors or female authors on course syllabi. A fourth mechanism refers to the stereotype threat that female students might experience because of the negative stereotype associated with women in philosophy that they perform worse than men do. A fifth hypothesis concerns the implicit bias that philosophy instructors hold against women, which might affect the way they interact with or behave towards female students. A sixth hypothesis refers to gender differences in ability beliefs related to success in philosophy, with women perceiving their abilities to be worse relative to that of men, regardless of whether or not it is true. The last hypothesis focuses on gender differences in academic belonging, comfort, and confidence in a philosophy class, and women, compared to men, feel less comfortable, less confident, and perceive negatively the atmosphere in philosophy as a field.

2.4 Gender differences in the overall self-efficacy beliefs

Gender differences in overall academic self-efficacy beliefs have been widely reported in the research literature, and male students were found to have higher overall beliefs about academic self-efficacy than their female peers. In a meta-analysis of more than 200 independent studies, Huang (2013) found that male students had slightly higher perceptions of academic self-efficacy than female students. Fisher, Schult, & Hell (2013) found that men had higher self-efficacy scores and higher self-perceived academic achievement. Similarly, Hinz et al. (2006) reported that male students tended to exhibit higher levels of self-efficacy compared to female students. Akram and Ghazanfar (2014) investigated the correlation between self-efficacy and student performance and found a positive correlation between students' self-efficacy and their performance, in addition to a pertinent disparity between male and female students since male students exhibited higher levels of self-efficacy as compared to females. Shkullaku (2013) found a significant gender difference among Albanian students, with male students reporting higher self-efficacy beliefs than females.

3. Method

The sample consisted of 376 students (56% females and 44% males) from various public high schools in Fes and its suburbs, including Ain Cheguag, Sefrou, and Taoujdate. The questionnaire was completed in class, and it was administered in Arabic to ensure the understanding of the question content and to remove any potential for ambiguity. To elicit demographic data such as age, gender, and school level, a section was provided to accomplish this purpose.

The authors developed the perceived school performance scale that measured students' self-efficacy beliefs for different academic subjects, which have traditionally been categorized as male versus female subject areas. It is a six-item scale measured on a 5-point Likert scale ranging from 1 (under average) to 5 (very good). In other words, to judge their abilities and self-efficacy beliefs, students were asked to rate their individual abilities across different subject areas, including mathematics, sciences (life/earth science and physics), languages (Arabic, French, and English), and philosophy.

4. The Research hypotheses

In light of what has been discussed earlier, the following hypotheses were tested:

H1: Male students, compared to females, would have significantly higher self-efficacy in traditionally masculine subjects, namely mathematics and sciences.

H2: Female students, compared to males, would show higher self-efficacy beliefs in traditionally feminine subjects, namely languages.

H3: Male students, compared to females, would have significantly higher global self-efficacy (all subjects).

H4: Male students would show higher self-efficacy beliefs in philosophy.

5. Results and Discussion

Principal component analysis with Promax rotation was conducted on the six items of the perceived school self-efficacy scale to see if the multiple school subjects could be categorized into reduced categories. The results of the principal component analysis yielded three factors. The first component explains 35% of the total variance and consists of two items: mathematics and sciences (life/earth science and physics. The second component, which explains 21% of the total variance, has two components or subjects: English and French. The third component accounted for two items: Arabic and Philosophy; this explains 16% of the total variance. The Cronbach's Alpha coefficient was calculated for the reliability of the academic self-efficacy perception scale and was found to be 0.70, which demonstrates a highly reliable score for the scale reliability. Table 1 demonstrates the results of the principle component analysis:

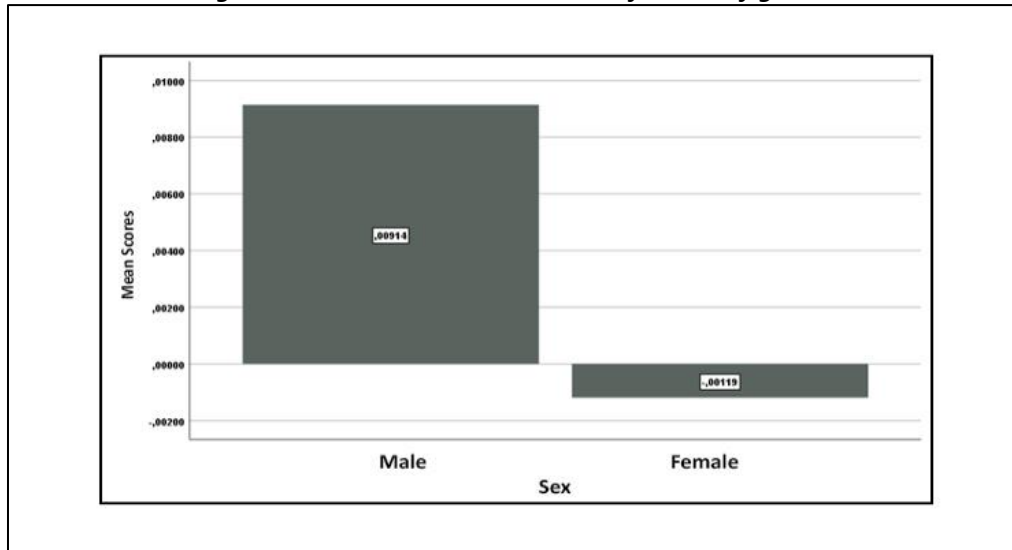
Table 1
Principal Component Analysis of the perceived self-efficacy

Shape Matrix^a			
	Components		
	1	2	3
Mathematics	,910		
Life and Earth Sciences/ Physics	,859		
English		,878	
French		,717	
Philosophy			,829
Arabic			,708
Variance	35%	21%	16%

Source: prepared by the authors using SPSS

5.1 Assessing Hypothesis 1

Based on the findings in the existing literature, it was expected that male students in this study would show firmer self-efficacy beliefs in mathematics and sciences than female students since these subjects have traditionally been theorized as male-dominated academic fields. This might enhance the gender role stereotype of females that mathematics, science, and physics are masculine subjects. An analysis of the means revealed significant differences between the male and the female students for math and science self-efficacy, with male students showing higher math and sciences self-efficacy beliefs than female students do. Figure 1 displays the difference in males' and females' scores clearly:

Figure 1: Math and science self-efficacy scores by gender

Source: prepared by the authors using SPSS

This finding appears to be congruent with those of earlier research (e.g. Betz & Hackett, 1981; Gainor and Lent, 1998; Hackett, 1985; Huang, 2013; Hyde et al., 1990; O'Brien et al., 1999; Pajares, 2005, especially for math self-efficacy). For example, Reilly, Neumann, and Andrews (2019) tested the gender segregation hypothesis in mathematics and science self-efficacy beliefs and achievement on a global level, using results from the 2011 Trends in Mathematics and Science Study (TIMSS). The authors found significant gender differences cross-culturally for science and mathematics self-efficacy beliefs favoring males even though both males and females scored equally in math and science tests across countries. Williams and Subich (2006) argued that in the traditionally male disciplines of math and science, males had better learning experiences and higher self-efficacy, whereas, in the traditional social subject domain, women were found to have strong self-efficacy beliefs and better learning experiences.

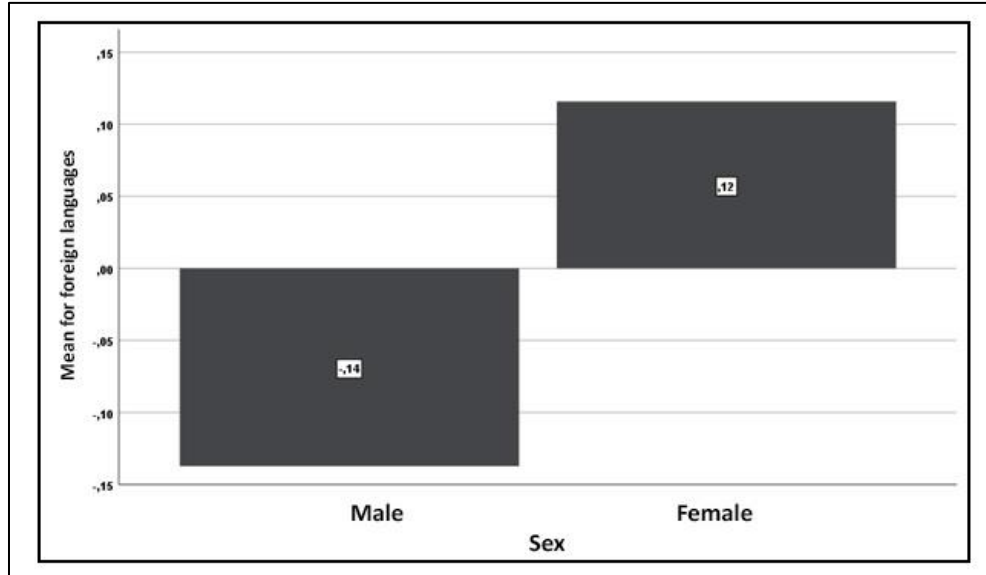
Conversely, this particular finding of male students' higher self-efficacy scores for mathematics and sciences seems not to corroborate with some other studies that reported no gender variations. For instance, in a longitudinal investigation of students in grades 5 to 7, Kenney-Benson et al. (2006) found no important variations in two waves of data. Further, Friedel et al. (2007) looked at grade 7 pupils' math self-efficacy and found no gender disparities. In an American context, Fouad & Smith (1996), Lopez & Lent (1992), and Middleton & Midgley (1997) observed no differences in males' and females' math self-efficacy. As for science self-efficacy, Anderman and Young (1994) noticed no gender differences that were statistically significant between male and female students; however, Britner and Pajares (2001) discovered that female grade 7 students showed stronger self-efficacy than male students did.

The results of the studies that investigated gender differences in math and science self-efficacy are mixed. However, a general conclusion can be drawn from the majority of studies and from the results of this study as well highlighting a common and pervasive trend that math and science-related fields are stereotyped as male dominated academic disciplines, which may influence female students' performance and motivation to choose mathematics or science related majors.

5.2 Assessing Hypothesis 2

It was also anticipated that female students would have significantly stronger self-efficacy for foreign languages than male students would, as language arts have been stereotyped as female-dominated academic fields. An Independent Samples t-test revealed that there was a statistically important difference between the male and female students for foreign languages perceived self-efficacy: $t = -2,351$, $p < .05$, with female students reporting higher foreign languages self-efficacy scores than their male counterparts. Figure 2 highlights clearly the difference in language self-efficacy scores for male and female high school students in this sample:

Figure 2: Foreign languages self-efficacy scores by gender



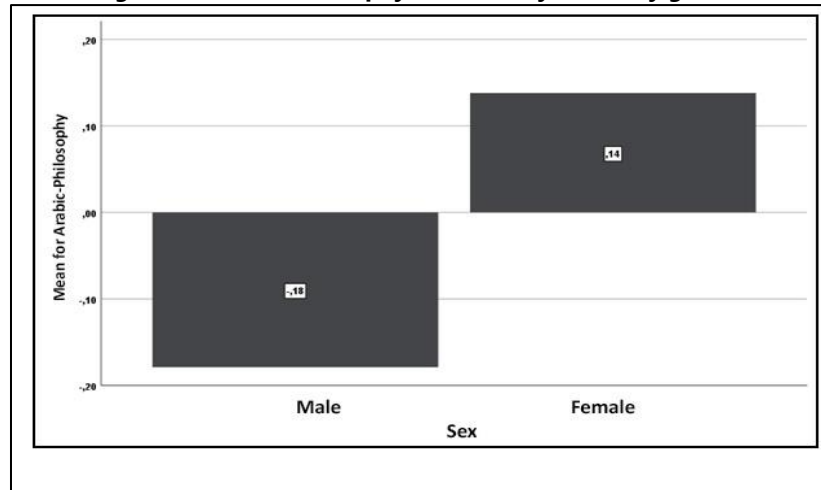
This particular finding seems to be in accordance with previous results studies on gender disparities in self-efficacy beliefs in language arts (e.g. Huang, 2013; Mills et al., 2007), wherein female students were found to exhibit firmer self-efficacy beliefs in languages than male students. In this context, Pajares and Miller (1994) found that female students, compared to males, had higher self-efficacy beliefs in learning Spanish. In addition, Usher and Pajares (2008) found that female students showed higher self-efficacy beliefs in learning French than male students. Onwuegbuzie et al. (2001) found that female students were more interested in learning a foreign language, which might suggest to male students that foreign language belongs to the feminine domain and consequently perceive FL study as a “female oriented foreign language culture”. Accordingly, male students might feel less comfortable than females in the language learning setting.

However, other studies found no significant differences in language self-efficacy beliefs between male and female students. For example, Hackett et al. (1990) conducted their study on the language self-efficacy beliefs of male and female college students and concluded that language self-efficacy is gender-neutral. More specifically, they found that students who had higher levels of language self-efficacy tended to have better academic achievement and were more likely to persist in language study. Overall, the pertinent finding that female students in this study hold higher foreign language self-efficacy scores than male students is in accordance with a gender stereotype perspective where language-related areas are more suited for females than for males. To put it differently, this particular finding supports the gender stereotype that women learn languages more effectively and that language-related fields are conceived as traditional subjects for women. This leads one to suggest that the gendering of school subjects or “doing gender” (West and Zimmerman, 1987) in schools reflects the impact of the socialization process on the psychology of boys and girls to abide by gender-appropriate behaviours assigned to them in their social environment.

5.3 Assessing Hypothesis 3

Based on the findings of prior studies, it was theorized that male students would have greater self-efficacy for Arabic-Philosophy than female students. To verify this hypothesis, an Independent Samples t-test was carried out to investigate whether male and female students would differ in their self-efficacy beliefs concerning the third factor extracted from the principal component analysis, which was labeled Arabic-Philosophy. The t-test results indicated that there was a statistically significant disparity between male and female students with regard to their Arabic-philosophy self-efficacy beliefs as $t = -2.962$, $p < .01$, with female students demonstrating higher Arabic and philosophy self-efficacy beliefs than male students do. This result does not find a lot of support in the literature where male students were found to show higher ability beliefs in philosophy. In fact, the finding that female students report higher Arabic-philosophy self-efficacy beliefs than male students is specifically interesting because philosophy is a non-traditional field for women. Figure 3 illustrates this variation:

Figure 3: Arabic-Philosophy self-efficacy scores by gender



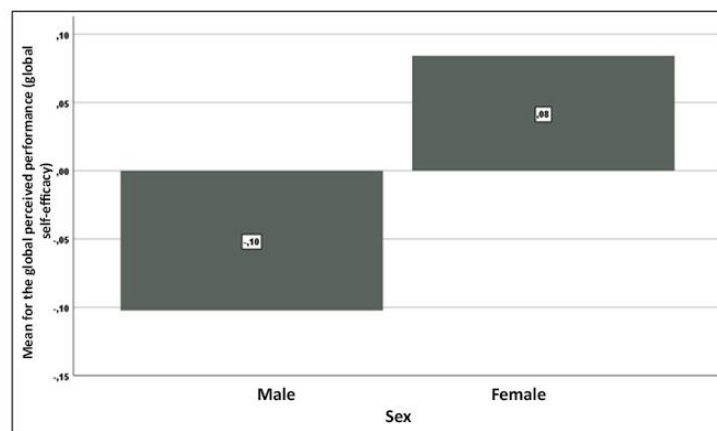
Source: prepared by the authors using SPSS

One interpretation of this finding might be attributed to the possibility that female students in this sample believe that they must work harder than men in order to thrive in a traditionally male academic subject (Jussim & Eccles, 1992). Holding such a belief would lead females to have higher self-efficacy beliefs in a male dominated field and, subsequently, perform at an equal level or even better than males. Another explanation might be attributed to the equal treatment of philosophy teachers towards male and female students in this sample. Maybe female students did not experience a stereotype threat that would negatively affect their beliefs in their abilities, especially in a non-traditional female academic area, thanks to the non-biased treatment of teachers towards a historically stigmatized group. A further interpretation of the given results would be that gender stereotypes did not affect Moroccan male and female students' self-efficacy beliefs for Arabic in general and for philosophy in particular. This justifies female students' higher rating of their abilities in philosophy, which has been traditionally and culturally associated with masculinity. In fact, this disparity also provokes the question of whether philosophy as a subject requires features and skills similar to those female students employ to learn languages, especially Arabic, in this case.

5.4 Assessing Hypothesis 4

Based on the research results mentioned earlier, it was predicted that male students would have higher overall academic self-efficacy beliefs compared to female students in this sample. An Independent Samples t-test was carried out to explore whether respondents' mean scores differed with regard to gender at a statistically significant level. The result indicates that there was a statistically significant disparity between male and female students with regard to their perceived global academic self-efficacy since $t = -2,635$, $p < .01$ and the self-efficacy beliefs of females were discovered to be superior to that of males.

Figure 4: The global perceived performance (global self-efficacy) by gender



Source: prepared by the author using SPSS

The obtained results seem intriguing and do not support prior research findings, which stress male students reporting consistently higher self-efficacy scores relative to female students because boys were observed to be more self-congratulatory in their responses (expressing overconfidence), whereas girls were more modest (Wigfield, Eccles, and Pintrich, 1996). This disparity may be partly because female students, overall, perform better than their male peers across several school subjects. In addition, this difference could be explained by the fact that female students did not experience a gender stereotype threat when rating their perceived overall academic performance. That is, female students in this sample showed more confidence in their perceived ability and performance at a general academic level rather than a subject-specific level because they were vulnerable to stereotype threat only in the subjects of sciences and mathematics, which are considered as masculine subjects.

6. Conclusion

The study examined the impact of gender on students' perceived self-efficacy across six subjects, which can be classified into stereotypically feminine subjects and male-dominated academic fields. Gender differences were observed, with male students showing higher self-efficacy beliefs in masculine subjects, including mathematics and sciences. This finding confirms the assimilation of the gender stereotype about math and sciences as male dominated academic areas by both male and female students in this sample. As for students' self-efficacy in foreign languages (French and English) as well as Arabic, female students rated their perceived performance higher in those traditionally female-dominated academic fields, a fact that reinforces the stereotype that females are better in language-related areas. Unexpectedly, female students' self-efficacy was higher in philosophy, which questions the view that philosophy is a male-dominated subject. Another interesting finding was that female students rated their overall self-efficacy higher than their male counterparts. This does not align with prior research findings that reported male students having firmer global self-efficacy beliefs.

7. Recommendations

The gender division in the perceived academic self-efficacy among high students in this study might reflect the existence of a gendered hidden curriculum that might instill in students a stereotypical belief that math and science are masculine subjects, whereas language-related areas are feminine subjects. This, of course, will undermine female and male students' self-efficacy, performance, and future academic choices in these traditionally feminine and masculine academic fields, respectively. In line with the findings of the given study, the following recommendations could be made:

- Teachers should not communicate any sexist attitude or behaviour, either intentionally or unintentionally, to male and female students because this can affect their perceived self-efficacy beliefs and abilities, especially in typically masculine and feminine subjects. Therefore, providing a safe and friendly environment to both male and female students in all subject areas would be a priority to promote their motivation, self-efficacy and performance, regardless of any academic gender stereotypical belief.
- Removing gender stereotypes from textbooks would be an important step to eradicate any implicit gender disparity and asymmetry, which can shape students' perceptions and attitudes and thus affect their subject specific self-efficacy and performance, and maybe their future academic choices and careers. Thus, it would be necessary to modify the educational system to avoid the reproduction of social divisions and inequities based on gender in the school setting.
- Developing strategies to promote positive self-efficacy for students through setting realistic goals to promote their competence and confidence in their learning as well as in their expected achievement despite the nature of the subject studied. This will help teachers have a clear understanding of their male and female students' motivation and interests to enhance their prospective academic performance.

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