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Original Paper

Do Girls Count? Gender Differences in Mathematics

Joseph Mamo[1,2]

[1] Part-time Lecturer, University of Malta, Malta

[2] Ex-Head of Department (mathematics), St Ignatius College, Malta

E-mail: jmamo1953@gmail.com

Abstract

The subject of gender differences in mathematics has been an international issue for at least the past fifty years. Traditionally males have not only performed better than females in mathematics examinations but have dominated mathematics-related courses at University level such as engineering, architecture and computer science. In this paper I take a look at results in a number of Maltese mathematics assessments such as End of Primary Benchmark, Secondary Education Certificate, Matriculation Certificate and Trends in International Mathematics and Science Study (TIMSS) over a number of years to establish whether such differences still exist. The outcome is that while differences in mathematics achievement appear to have disappeared, enrolment in 'A' level mathematics is dominated by males and so are mathematics-related university courses in engineering, architecture and computer studies.

Keywords: mathematics, males, females, gender differences, assessment

1. Introduction

The attainment of girls in mathematics has been an issue since the 1960s (Burton, 1986). Boys have been reported to do better than girls in mathematics, with more males obtaining the highest grades. (Costello, 1991; Hanna et. al., 1990). However, recent international studies (e.g. Mullis et. al., 2009) have shown no significant differences between boys and girls. Indeed McCormack (2014) notes that "great gains have been made by females over the past several decades, and more recent research has documented few and marginal gender differences in mathematics performance" (p. 50).

The issue of gender differences comprises four questions.

1. Why should any differences be an issue in the first place?
2. Are males still performing better than females in mathematics?
3. If it is true that males do better in mathematics than females, what is the cause of this discrepancy?
4. What can be done to bridge the gap, if this exists?

I would like to address the first issue straightaway. Should differences in mathematics attainment be a matter of concern? Concern about gender differences in mathematics attainment is a serious issue because, first of all, professions like engineering, computing, architecture, are amongst the best paid and may explain why males tend to earn significantly more than females do. As Paechter (2001) remarks.

> It matters for girls because by not opting to take GCE A level they are closing doors to high status careers in mathematics, science and engineering. It matters for the country because it is significantly reducing the numbers of those who might go on to work in the wealth-producing fields of science and technology (p. 52).

Secondly, as Henrion (1997) has pointed out, "if mathematics becomes the practice of only one group of people, it limits the collective imagination that leads to creativity" (p. 264). This is why we should, in my opinion, strive to eliminate gender inequalities, notwithstanding the fact that these differences may still be difficult to eradicate.

The aim of this paper is to throw some light on the second of these questions by looking at a wide variety of sources of assessment. The paper is divided into three parts. Following this brief introduction, I will give a brief overview of education in Malta and the role of mathematics within the system. In the third part I will be looking at a range of data with the aim of establishing any differences in attainment between males and females in Malta.

2. Education in Malta

Compulsory education in Malta starts at the age of five and ends when children are sixteen years of age. It is divided into two phases – primary and secondary – the latter phase starting when children are eleven years old. Before attending primary schools, most children are sent to kindergartens. Children in Malta attend either state schools or private schools, the latter being either church schools or independent schools. State education is free of charge while salaries of teachers in church schools are subsidized by the state. At the end of primary education many students sit for national benchmark examinations in English, Maltese and Mathematics. At the end of secondary education most students sit for a national examination in a wide range of subjects called the Secondary Education Certificate (SEC). Two sessions of this examination are held, one in May and another in September – the latter session being for students who would like to re-sit an examination that they might have failed in May. This examination consists of two papers. All students sit for the first paper. Students opt for one of two versions of the second paper. The second paper, known as Paper IIB, is less challenging than Paper IIA, and students can achieve a maximum of Grade 4 to a minimum of Grade 7. Those taking Paper IIA can obtain Grades 1 to 5. Because of the fact that entry into post-secondary institutions require a grade of 1 to 5 in English, Maltese and Mathematics, these subjects are the ones that most students sit for.

After completing secondary education, students can opt to pursue further studies in one of three institutions: Upper Secondary, Malta College of Arts, Science and Technology (MCAST) or the Institute of Tourism Studies (ITS). The first prepare students to sit for Advanced Level subjects while in MCAST students may enroll in one of a wide range of vocational courses. ITS prepares students for work within the tourist industry. Most students attending Upper Secondary Education enroll in two subjects at A-level, three at Intermediate level and a sixth subject called Systems of Knowledge. On successfully completing these six subjects, students are awarded the Matriculation (MATSEC) certificate. Enrolment in a subject at Advanced or Intermediate level requires a grade 5/C at SEC level, though it is usually recommended that a student intending to enroll for advanced level mathematics will have opted for the more challenging version of the second paper (Paper IIA) and are awarded a good grade, preferably 1 or 2, overall.

Mathematics plays a very important part in the education of students. It is not only a compulsory subject during the primary and secondary phases but enrolment in a number of faculties at University is only possible if one is successful at either Intermediate or Advanced level Mathematics. An overview of the Maltese education system is depicted in Figure 1.

3. The Evidence

In this section I use a number of official documents to discuss the Mathematics attainment of Maltese students. These include

- End of Primary Benchmark Reports
- SEC Examinations Statistical Reports
- Matriculation Certificate Examinations Statistical Reports
- Trends in International Mathematics and Science Study (TIMSS) International Mathematics Reports
- Programme for International Student Assessment (PISA) Reports

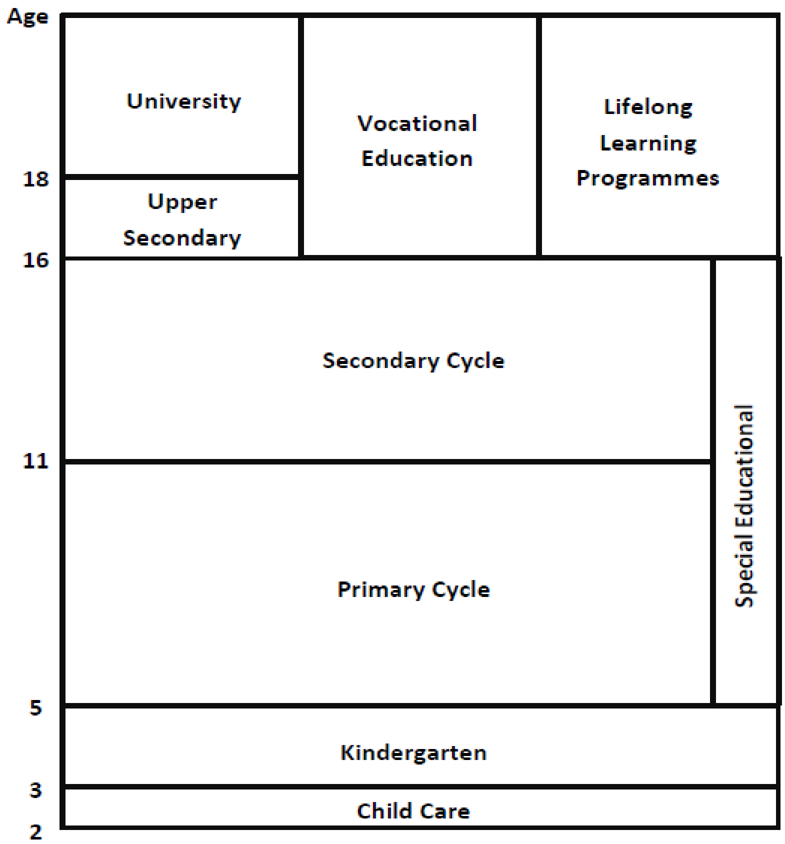

Figure 1. The Maltese Education System

4. End of Primary Benchmark Examination

The End of Primary Benchmark Reports present results as percentiles. Percentiles divide the values in a distribution into hundred equal parts. Thus the 25th percentile is the value that 25% of the distribution is less than or equal to. Table 1 suggests that differences between male and female students have from 2013 to 2019 been minimal (Directorate for Quality and Standards in Education, 2013-19).

Table 1. End of Primary Benchmark 2013 – 2019

Year	Percentile					
	25th		50th (Median)		75th	
	Male	Female	Male	Female	Male	Female
2013	54	56	75	75	89	87
2014	52	51	70	70	84	82
2015	46	50	72	71	87	86
2016	57	61	78	79	91	91
2017	49	51	70	68	85	82
2018	56	57	75	74	87	85
2019	51	51	72	70	86	84

5. Secondary Education Certificate (SEC) Examination

The SEC Reports provide a more detailed picture of differences between male and female students. For the purposes of this paper I only consider the results of the 16-year old cohort in the May session of the examination. This means that, for example, 2016 results only include the results of students born in 2000. This is done to ensure a certain amount of uniformity in the age and education of the students. It is also important to note that the values in Table 2 are representative of students who obtained grades 1–5 as a percentage of students who registered for the examination. As can be seen from the table, with the exception of 2012, differences are minimal, sometimes in favour of the males (2014, 2015, 2016 and 2019) and sometimes in favour of the female students (2010, 2011, 2012, 2013, 2017, 2018) (MATSEC Examinations Board (2011-2019)). These results differ from those obtained by Fenech (2011) who, in considering SEC results from 2006 to 2009, found that male students outperformed their female counterparts in all content areas (Number, Algebra, Shape, Space and Measures and Data Handling). However, they are corroborated by results of research carried out elsewhere. In a meta-analysis carried out by Else-Quest and Hyde (2010), they concluded that, on average, "males and females differ very little in mathematics achievement, despite more positive math attitudes and affect among males." (p.125) Similarly, in a meta-analysis that analyzed gender differences, Lindberg et al. (2010) concluded that gender differences in mathematics performance were very small sometimes favouring boys and sometimes favouring girls.

Table 2. Percentage of Students Obtaining Grades 1-5 in SEC Examinations

Year	Male	Female	Difference*
2010	63.7	64.1	–0.4
2011	63.6	65.6	–2.0
2012	59.7	69.2	–10.0
2013	62.1	64.0	–1.9
2014	64.6	63.4	+1.2
2015	64.0	61.3	+2.7
2016	64.2	63.5	+0.7
2017	62.7	64.1	–1.4
2018	65.2	65.6	–0.7
2019	65.3	62.6	+2.7

* A "+" indicates a difference in favour of male students, a "–" indicates a difference in favour of the female students.

Here it is important to note that the number of students registering was virtually equal, with differences probably reflecting the differences in the 16-year old cohort (Table 3).

Table 3. Students Registering for SEC mathematics

Year	% Male	% Female	Total
2010	49.05	50.95	3876
2011	49.72	50.28	3803
2012	49.83	50.17	3791
2013	50.72	49.28	3762
2014	49.50	50.50	3733
2015	49.26	50.74	3526
2016	47.59	52.41	3608
2017	49.64	50.36	3340
2018	50.3	49.7	3274
2019	47.5	52.6	3515

Citing the results obtained by the Assessment of Performance Unit (APU), Burton (1986) notes that "it is only in the top attainment band that differences in performance become notable" (p. 5). More recently, Williams and Ceci (2007), citing the findings of Hedges and Nowell (1995), draw attention to the superiority of males at the tails of the distributions. Similarly, Halpern et al. (2007) point out that "substantial evidence suggests that the male advantage in mathematics is largest at the upper end of the ability distribution" (p. 59). To test whether this is true in the case of Maltese students, I examined the number of students obtaining the top grades of 1 and 2 and "unclassified" in the SEC examination.

Table 4. Percentage of Students at the Ends of the SEC Distribution

Year	Secondary Education Certificate					
	% Grades 1 and 2			% Unclassified		
	Male	Female	Diff	Male	Female	Diff
2019	21.0	17.8	+3.2	16.6	17.7	–0.9
2018	20.1	18.8	+1.3	17.0	16.2	+0.8
2017	19.5	17.2	+2.4	18.2	17.5	+0.7
2016	16.5	15.2	+1.3	16.7	15.9	+0.8
2015	17.3	16.5	+0.8	17.2	18.2	–1.0
2014	19.5	16.2	+3.4	18.2	16.3	+1.8
2013	20.1	16.4	+3.7	21.6	17.9	+3.8
2012	18.5	17.5	+1.0	22.1	14.6	+7.5
2011	18.3	17.4	+0.9	19.4	16.4	+2.9
2010	18.9	15.5	+3.4	18.8	16.4	+2.4

A "+" indicates a difference in favour of male students, a "–" indicates a difference in favour of the female students.

Table 4 seems to confirm the tendency for more male students at both extremities of the distribution in agreement with the above-cited research.

6. Trends in International Mathematics and Science Study (TIMSS)

The Trends in International Mathematics and Science Study (TIMSS) is a comparative international study of mathematics and science achievement conducted by the International Association for Evaluation of Educational Achievement (IEA) and takes place every four years. Malta participated in TIMSS in 2007 (8^{th} grade), 2011 (4^{th} grade), 2015 (8^{th} grade) and 2019 (4^{th} grade). The results obtained by Maltese pupils in 2011 contrast sharply with those obtained by Maltese students in 2007.

7. Eighth Grade Students

TIMSS 2007

Girls had a higher score than boys internationally (453 and 448 respectively) with girls doing better than boys in 16 out of 49 participating countries, while boys had a higher average achievement in 8 countries. With respect to scores of Maltese (Form 3/Year 9) students there was no difference between girls and boys. Table 5 and Table 6 show the scores of male and female students in the Content and Cognitive Domains (Mullis et al., 2009).

Table 5. Achievement in Mathematics Content Domains (2007)

	Number	**Algebra**	**Geometric Shapes and Measures**	**Data and Chance**
Boys	497	476	471	486
Girls	495	471	476	487

Table 6. Achievement in Mathematics Cognitive Domains (2007)

	Knowing	**Applying**	**Reasoning**
Boys	489	491	476
Girls	492	494	473

TIMSS 2007 also investigated what students think about their abilities in learning mathematics by compiling an index of Students' Self-Confidence in learning Mathematics (SCM). As can be seen in Table 7 more boys than girls tend to have a higher SCM, both locally and internationally.

Table 7. Students' Self-Confidence in Learning Mathematics (SCM)

	High SCM		**Medium SCM**		**Low SCM**	
	Girls	**Boys**	**Girls**	**Boys**	**Girls**	**Boys**
Malta	36	40	33	37	31	23
International	41	45	37	37	22	18

These results suggest that girls tend to rate mathematics as being difficult more than boys. In fact Costello (1991) noted that,

> Girls are far more likely to express the view that mathematics is difficult than boys are. This difference in attitude is an exaggeration of the difference in performance. Boys tend to underrate

> the level of difficulty and overrate their own competence: they frequently do less well than they expect. Girls are more likely to overrate the difficulty and devalue their own expertise: they often achieve better results than they expect (p. 146).

Similarly, in a study conducted by Lalonde et al. (2003) with girls and boys participating in a regional mathematics contest, they found that even in the case of students who showed an interest and aptitude in mathematics, the girls expressed less confidence in their abilities.

TIMSS 2015

The international average for girls was 483, while that for boys it was 480. Boys performed significantly better than girls in Mathematics in 6 of the participating countries, while girls outperformed boys in 7 countries. In the other countries the differences were not significant ones. The mean Mathematics score for Maltese boys (495) exceeded that of girls (492) by around 3 scale points, but the difference was not a significant one. Table 8 and Table 9 show the scores of male and female students in the Content and Cognitive Domains (2015 TIMSS National Report).

Table 8. Achievement in Mathematics Content Domains (2015)

	Number	**Algebra**	**Geometric Shapes and Measures**	**Data and Chance**
Boys	503	487	482	485
Girls	498	498	486	488

Table 9. Achievement in Mathematics Cognitive Domains (2015)

	Knowing	**Applying**	**Reasoning**
Boys	497	493	496
Girls	501	494	501

The data presented in this section so far suggest that girls performance in mathematics is not inferior to that of boys. Indeed the results emerging from the 2015 TIMSS study would suggest that girls are marginally better in a number of areas. However one result that emerged from TIMSS 2015 which confirmed that of 2007 was the tendency for boys to be more confident than girls in mathematics.

TIMSS 2011

In 2011, 3607 4th grade (Year 5) Maltese pupils were tested in both Mathematics and Science. These pupils, whose average age was 9.8 years, were selected randomly from 96 Primary Schools. In order to compare scores at different cycles, the TIMSS achievement scale score is a rescaled version of the total score, which has a mean of 500 and a standard deviation of 100 (Mullis et al., 2013).

In 17 of the 49 participating countries girls did better than boys while in 26 countries the mean Mathematics scores for males and females did not vary significantly. The mean Mathematics score for Maltese boys (499) exceeded that of girls (492) by 7 scale points. As can be seen in Table 10, boys' performance in the content domains was better than that of the girls. Similarly, boys did better in all cognitive domains (Table 11).

Table 10. Achievement in Mathematics Content Domains (2011)

	Number	Geometric Shapes and Measures	Data Display
Boys	502	489	499
Girls	493	484	497

Table 11. Achievement in Mathematics Cognitive Domains (2011)

	Knowing	Applying	Reasoning
Boys	508	498	480
Girls	500	494	470

TIMSS 2019

3630 Maltese students participated in the TIMSS study, of which 1784 were girls and 1846 were boys. The average age of these students was 9.8 years. In 43 countries, including Malta, boys performed better than girls in Mathematics; in 13 countries girls performed better than boys. There was a significant difference between the mean Mathematics score for Maltese boys (513) and girls (505) of around 8 scale points (Ministry of Education, 2019).

Table 12. Achievement in Mathematics Content Domains (2019)

	Number	Measurement and Geometry	Data Handling
Boys	514	502	517
Girls	510	492	506

Table 13. Achievement in Mathematics Cognitive Domains (2019)

	Knowing	Applying	Reasoning
Boys	515	511	509
Girls	504	504	507

One pertinent question that needs to be addressed is to explain the apparent anomaly presented by the TIMSS and the Benchmark results. While the former results suggest a discrepancy in mathematics between boys' and girls' attainment in Year 5, the latter do not indicate any differences in Year 6. Neither were any significant differences noted with Year 9 students in TIMSS 2007 and 2009.

8. Programme for International Student Assessment (PISA)

PISA is an international assessment of mathematics, reading, science, and problem-solving literacy of 15-year old students conducted on a three-year cycle by the Organisation for Economic Co-operation and Development (OECD). Unlike TIMSS whose aim is to assess the attained curriculum, or what students have learned in the classroom, PISA assesses students' competency to address real-life challenges involving reading science and mathematics. Malta has participated in PISA in 2009, 2015 and 2018. In 2009, on average across OECD countries, the mean mathematical literacy score for boys exceeded that of girls by 15 scale points (Ministry for Education and Employment, 2013). In 2015, girls scored 4 points higher than males in mathematics but the difference was not significant (Ministry for Education and Employment, 2015). In 2018, on average across OECD countries, the mean mathematics score for boys exceeds that of girls by 5 scale points. However, in 12 countries, including

Malta, the difference was significantly in favour of girls. Indeed the mean for Maltese girls was 12 scale points higher than the mean for the Maltese boys (Ministry for Education and Employment, 2018).

9. Advanced and Intermediate Level Mathematics

A look at results obtained by students in the Advanced Pure Mathematics (Table 14), Intermediate Pure Mathematics (Table 15) and Intermediate Applied Mathematics (Table 16) suggest that female students are performing better than their male counterparts in these examinations (MATSEC Examinations Board, 2011-19).

Table 14. Percentage of Students Obtaining Grades A-C at Advanced Level Pure Mathematics

Year	Male	Female	Difference
2010	38.3	37.0	+1.3
2011	46.5	46.2	+0.3
2012	48.1	49.8	–1.7
2013	39.3	49.2	–9.9
2014	49.6	54.4	–4.8
2015	52.5	50.6	+1.9
2016	40.7	53.8	–13.1
2017	45.7	53.6	–7.9
2018	53.4	57.4	–4.0
2019	50.6	57.5	–6.9

Table 15. Percentage of Students Obtaining Grades A-C at Intermediate Level Pure Mathematics

Year	Male	Female	Difference
2010	21.40	23.27	–1.87
2011	21.08	26.55	–5.47
2012	36.29	32.40	+3.89
2013	34.16	35.47	–1.31
2014	28.22	40.54	–12.22
2015	33.21	40.61	–7.4
2016	30.22	44.25	–14.03
2017	36.8	47.9	–11.1
2018	31.0	42.9	–11.9
2019	35.9	48.7	–12.8

Table 16. Percentage of Students Obtaining Grades A-C at Intermediate Level Applied Mathematics

Year	Male	Female	Difference
2010	44.6	46.4	–1.8
2011	38.9	45.7	–6.8
2012	56.8	50.0	+6.8
2013	45.7	80.0	–34.3
2014	51.4	55.6	–4.2
2015	38.6	56.0	–17.4
2016	44.4	57.1	–12.7
2017	58.3	60.0	–1.7
2018	50.0	43.8	+6.2
2019	34.8	23.1	+11.7

One must note that I did not present results for Advanced Applied Mathematics as the Matriculation Certification regulations prohibit students from enrolling for both Pure and Applied mathematics at Advanced level. As a result only a small number of students enroll for Advanced Applied Mathematics. However, students can enroll for Advanced Pure Mathematics and Intermediate Applied Mathematics.

The data presented in the previous section suggests that

- Up to compulsory education, there seem to be no significant differences in Benchmark and SEC results, though more male students tend to obtain grades 1 and 2 in the SEC examinations.
- The results obtained by Maltese students in TIMSS are rather inconsistent with no significant differences between Year 9 students in 2007 and 2015, but with Year 5 boys outperforming girls in both content and cognitive domains in 2011 and 2015.
- At Intermediate and Advanced level Pure Mathematics and Intermediate Applied Mathematics the performance of female students is overall significantly better than that of their male counterparts.

These results suggest that while there are some differences in compulsory education, sometimes in favour of boys and sometimes in favour of girls, females tend to do better than males in Intermediate and Advanced level Mathematics. However, this is only part of the picture. What is perhaps rather unexpected is the fact that the number of female students enrolling for Advanced Pure Mathematics and Intermediate Applied Mathematics is significantly less than the number of male students (Table 17) corroborating similar trends abroad (Rodgers, 1990; Fennema, 1990; Ceci et al., 2014).

Table 17. Percentage of Students Registering for Pure and Applied Mathematics

	APM*		IPM*		IAM*	
Year	**Male**	**Female**	**Male**	**Female**	**Male**	**Female**
2010	67.0	33.0	46.1	53.9	66.7	33.3
2011	65.9	34.1	38.9	61.1	60.7	39.3
2012	65.2	34.8	42.5	57.5		
2013	68.3	31.7	42.8	57.2	70.0	30.0
2014	68.0	32.0	41.4	58.6	66.0	34.0
2015	69.4	30.6	46.9	53.1	63.8	36.2
2016	68.5	31.5	45.1	54.9	46.2	53.8
2017	69.2	30.8	50.3	49.7	70.1	29.9
2018	66.9	33.1	45.7	54.3	55.6	44.4
2019	65.2	34.8	48.7	51.3	63.9	36.1

* APM – Advanced Pure Mathematics

* IPM – Intermediate Pure Mathematics

* IAM – Intermediate Applied Mathematics

Another significant, and in my opinion worrying, statistic is the fact that the number of students sitting for Advanced Pure Mathematics has decreased drastically during the past nine years (see Table 18). These statistics raise an important question: Why are females shying away from enrolling for Advanced Pure Mathematics and preferring to enroll for Intermediate Pure Mathematics instead, when their results during compulsory education were on a par with those of the male students?

Table 18. Number of Students Registering for Advanced and Intermediate Mathematics

Year	APM	IPM	IAM
2010	655	590	84
2011	686	475	89
2012	653	558	
2013	615	656	50
2014	569	694	53
2015	549	621	69
2016	495	617	39
2017	494	579	34
2018	490	524	36
2019	500	532	36

This trend seems, as Boaler (2009) points out, to exist in other countries as well.

> The participation rates for young women and men in A-level mathematics in England show that we still have a long way to go before we can claim gender equity in mathematics … Fifty-two per cent of higher education graduates across Europe are women but only 25% of these women take science, engineering or technology subjects (p. 130).

Similarly, while noting that females have gained ground in mathematics in relation to males, Wiest (2010) notes that gender gaps are still pronounced at the highest achievement levels. Citing the Institute of Education Sciences (2008), Wiest (2010) points out that in the US, "females earned 57.5% of all 2005-2006 bachelor's degrees but only 45.1% of those conferred in mathematics and statistics" (p. 56). Mendick (2006) reports similar trends, noting that male dominance increases as one progresses to undergraduate and postgraduate levels and in the larger number of men than women working in mathematics-related jobs. Comparable trends were reported by Bosch and Trigueros (1996), cited in Ursini et al. (2010), analyzing data from Mexico. According to Ceci et. al. (2014),

> … women are underrepresented in college majors, graduate school programs, and the professoriate in those fields that are the most mathematically intensive, such as geoscience, engineering, economics, mathematics/computer science, and the physical sciences (p. 75).

This trend is also prevalent in Malta where female students tend to shy away from Advanced Pure Mathematics and consequently from university courses which have a significant mathematics content such as Computing and Engineering. Table 19 shows the percentage of male and female students accepted in the faculties of Built Environment, Engineering and ICT. According to Samuelson and Samuelson (2016) this trend may be due to the fact that boys may have realised "the necessity for knowing and handling mathematics in order to be able to work in professions such as engineer, architect or scientist - all still seen as more 'male'" (p. 29).

Table 19. Registrations in STEM Faculties (2010-2019)[1]

Year	**Built Environment[2]**		**Engineering[3]**		**ICT[4]**	
	Female	**Male**	**Female**	**Male**	**Female**	**Male**
2010-2011	40.1	59.9	20.8	79.2	25.00	75.00
2011-2012	36.6	63.4	21.6	78.4	20.72	79.28
2012-2013	37.4	62.6	23.4	76.6	20.78	79.22
2013-2014	34.3	65.7	23.2	76.8	23.42	76.58
2014-2015	37.7	62.3	20.5	79.5	21.88	78.13
2015-2016	42.7	57.3	20.1	79.9	20.07	79.93
2016-2017	49.1	50.9	21.4	78.6	16.53	83.47
2017-2018	45.2	54.8	22.8	77.2	18.88	81.12
2018-2019	39.0	61.0	22.9	77.1	18.29	81.71
2019-2020	35.3	64.7	27.2	72.8	21.53	78.47

[1] Data retrieved from https://www.um.edu.mt/registrar/factsAndfigures/studentnumbers

[2] Includes students from BSc (Hons) in Built Environment Students and Bachelor of Engineering and Architecture (Hons)

[3] Includes students from B.Eng. (Hons) Electrical and Electronic Engineering and B.Eng. (Hons) Mechanical Engineering

[4] Includes students from B.Sc.(Hons) and B.Sc. IT (Hons)

10. Concluding Remarks

The data presented above suggests that differences between male and female students on a number of mathematics examinations have, in general, diminished. Although the data considered goes back to 2010, one can conclude that when compared to the results obtained by Fenech (2011) some progress seems to have been made to eliminate any gender biases in the performances of male and female students in mathematics attainment.

This does not mean that none exists particularly beyond compulsory education. Indeed, the fact that fewer female students obtain higher grades in the SEC examinations and opt for advanced level mathematics and for university courses that feature mathematics, namely Built Environment, Engineering and ICT, suggest that gender differences in mathematics still exist. Identifying the factors that may be contributing towards this bias is a complex issue and lie beyond the aim of this study.

However I think that they ought to be addressed by means of future research. One area that, in my opinion, needs to be studied is whether teachers and parents themselves are contributing to this gender bias, especially now that boys and girls are attending the same classes in Maltese state secondary schools. It is not difficult for a teacher to put someone off from studying a subject by adopting negative strategies in the classroom. Reporting on her personal experiences during ‘A’-level lessons, Busuttil (2013) recounts how lessons “were dominated by male discourse where the teacher would solely speak to the male students, argue about football, sailing and simply leave the girls out of the discussion” (p. 2). Her experience of mathematics at University were not much better with the result that she lost the “self-assurance” she had acquired in primary, secondary and post-secondary mathematics classes. “My Mathematical voice,” she states, “vanished as soon as female answers seemed to be inferior to male answers, as soon as lecturers stopped asking female students and expected answers from the boys” (p. 3). How widespread are such negative attitudes among parents and teachers and what impact do they have on students’ choice of career?

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