Multicultural Education

Volume 12, Issue 5, 2026

# Gender Disparity in Science, Technology, Engineering, Mathematics (STEM) Programs at Jordanian Universities

**Omar Bataineh, Ahmad Qablan**

**Article Info**

***Article History***

Received:
February 09,2026

Accepted:
May 10,2026

***Keywords :***
Gender disparity, Jordan, STEM

**DOI:**
10.5281/zenodo.20111448

**Abstract**

*The purpose of this study is to identify Jordanian university students' preferences, enrollment, and percentages of those who earn a university degree in any of STEM fields. Quantitative data analysis revealed a disparity inpreferences and percentages of males and femaleswho enroll in STEM education, while male students prefer to pursue a degree in almost every field of engineering except Architectural and Medical engineering, female students prefer to study fields related to Medical sciences, Basic sciences, and Mathematics. The only field that equally attracts both males and females is Computer sciences and applications. The study attributes that disparity to the job market's preference that favors to hire men to do certain jobs such as Engineering, while favors to hire women to do jobs related to Medical and teaching fields. The study suggested offering certain multisectoral efforts to address gender disparity and spark Jordanian women's interests to pursue STEM education.*

## Introduction

In 2015, the (UN) General Assembly in September adopted the 2030 Agenda for Sustainable Development(UN, 2016). The Agenda calls for a new vision to address theworld environmental, social, and economic concerns.It includes 17 SustainableDevelopment Goals (SDGs), where both SDG4 and SDG5 goals address quality education and gender equality (UN,2016).

UNESCO recognizes that for education to achieve itspotential, critical changes are needed at both local and global levels (UNESCO, 2016). It believes that to improve educational quality, persistent disparities in access and achievement in education need to be eliminated. Eliminating these disparities will help provide learners with the essential knowledge, skills, attitudes which will consequently ensure building inclusive and sustainable societies.

There is a global consensus among several stakeholders that Science, technology, engineering, and mathematics (STEM)education can play a vital role in transforming societies towards sustainability (UNESCO, 2017, Marginson et al., 2013). They argue that achieving the 2030 Sustainable Development Agenda necessitates adopting such interdisciplinary approach of education (UN, 2016, UNESCO, 2017, Deloitte. 2016). Researchers also emphasize that STEM education has already introduced several improvements in manyaspects of our life, such as health, agriculture, infrastructure,and renewable energy (UNESCO, 2016). It also plays a vital role in transforming future careers and enabling future generations to actively contribute to building sustainable societies (UNESCO, 2017, Deloitte. 2016).

STEM education been considered as an important national development tool that shapes how future citizens perceive and understand the world and enables them to take part in a progressive competitive global economy (Arabian Business Consultants for Development, 2017). According to the US government definition, STEM includes physical, biological, and agricultural sciences; computer and information sciences; engineering and engineering technologies; and mathematics. But it does not include social and behavioral sciences, such as psychology and economics (U.S. Government Accountability Office, 2015).

Ensuring girls have equal access to STEMeducation and careers is importantfrom the human rights, scientific, and developmentperspectives (UNESCO, 2014, Girl Scouts of the USA, 2016). From a human rights perspective, allhumans are equal and should have equal opportunities to study and work in the field that they like (UNESCO, 2014).

From a scientific perspective, the inclusion of girls in studying and working in STEM fields ensures scientific excellence and boosts the qualityof STEM outcomes (Marginson et al., 2013, EU, 2012).STEM requires a wide pool of talented boys and girls to promoteexcellence in societies and leaving out girls is a loss for all (Blickenstaff, 2005).

From a development perspective, STEM contributes to establish gender equality in societies and enable both genders to enhance their status and income (UNESCO, 2014). STEM also ensures that boys and girls can acquire skills and have equal opportunities to contribute to developing their societies (UNESCO, 2017).

Although, the global status of women participation and achievement in STEM education has been enhanced during the past years, gender disparity has not been eliminated (OECD. 2016, Mullis et al., 2016). While more women are taking part in STEM workforce than ever before, they are still encountering several barriers that limit their engagement, representation, and participation in many countries (NSF. 2013, Ceci et al., 2014).

Studies show that the Arab region is the most youthful regions in the world (World Bank, 2016). Compared to the global age average (UNESCO, 2017), the median age of Arab youth is 22 making that 60% of the Arab population is under 25 years old. These numbers put great stress on many sectors in the region and especially on the Education sector (World Bank, 2016, Islam, 2016).

Despite the massive instability in most of the Arab countries, many governments have shown strong commitment to offer their youth good educational opportunities to enhance their competitiveness (ArabDev, 2016). Moreover, Arab government have worked hard to enhance the status of women and enable them to take active part in developing the economy of their countries. That enabling was promoted by increasing women participation in higher education (US News, 2017, ArabDev, 2016).

In Jordan, the government have invested a huge amount of money and efforts to develop the quality of education offered to Jordanians. For example, in early 1990s, the government launched a10-year national educational reform project (Education Reform for Knowledge Economy) (ErFKE) that focuses mainly on ICT integration for the sake of making Jordan a regional hub for technology and enable Jordanians to play an active role in enhancing the national as well as the global economy (Al-Jaghoub, Westrup, 2003, Qablan et al., 2009). Such efforts were strengthened by the recent national projects and initiatives such as the Jordanian National Employment Strategy and the Jordan Vision 2025 (JV 2025). Furthermore, several national studies have also been undertaken by the National Centre for Human Resource Development (NCHRD) to assess and emphasize the need to enhance university graduate skills to enable them to take part and contribute to developing the national economy (UNESCO, 2018).

Surprisingly, all those studies and reports did not mention STEM education and ignored the importance of encouraging girls to study STEM fields at bothschool and university levels. Furthermore, they highlighted gaps that exist in the national labour market without defining the specific details of skills and competencies needed to support the national economic growth and policies that are needed to encourage both girls and boys to study STEM education and particularly keeping girls in the national STEM pipeline.

The ambiguity of a comprehensive understanding of the rationale and significance of STEM education among Jordanian education stakeholders (i.e., Ministry of Education and Ministry of Higher Education and Scientific Research) has led to offer Jordanian school students the subcomponents of STEM (physics, chemistry, biology, and mathematics) without addressing the blended and active learning which is required for effective STEM education.

The case in the higher education sector is not as hopeful as STEM is not well known among academia and universities offer degrees in different subcomponents of STEM (i.e., science, mathematics…) without addressing the interdisciplinary nature of STEM to students. This lack of understanding of the rationale of STEM leads to the misalignment between university graduates' skills and competencies and those required by the current and future careers and occupations (Arabian Business Consultants for Development, 2017).

In the 2019 report published bythe Organization for Economic Cooperation and Development, Jordan wasone of three countries wherewomen felt more comfortable with mathematics thanmen (OECD, 2018). Studies showed that almost half (47%) of undergraduates in STEM fields were women. However, it is not known the enrollment, preferences, and percentage of those who graduated with a degree in any of the STEM fields. Answering these questions is crucial to understand the barriers that prevent women from finishing their university degrees in STEM education and limit their representation and contribution to the national economy.

Therefore, this study came to address thatgap by identifying the enrollment, percentages, and preferences of women who pursue their university degree in any of the STEM fields. The importance of conducting this study is to provide Jordan's educators and policy makers with authentic research data about the status of STEM educationat the university level and help them put the needed policies to encourage both genders to continue their STEM university education. It is hopeful that the results of this study will highlight the importance of strengthening STEM education in Jordan's universities as well as the importance of keeping women in various STEM fields to help strengthen the national economy and enhance the competitiveness of Jordan's workforce at the national, regional, and global levels.

This study came to answer the following questions:

1. What is the current enrollment rate of men and women in STEM fields in Jordan?
2. What is the percentage of female and male graduates earning a degree in any of the STEM fields?
3. What STEM field that is mostly favored by male and/or female university graduates?

**Methodology**

*Population and sample*

The population of this study consisted of all university graduates from all STEM fields in all Jordanian universities during the period of 2008-2018. The Hashemite University (HU) was chosen to be the place of this study. The rationale of choosing (HU) is it is one of the largest universities in the country. It also offers all STEM subjects to undergraduate students. The sample of this study were all STEM fields graduates during the period from 2008-2018. The sample consisted of 16134 male and female students graduated with a STEM degree from 2008-2018 (Table 1). Such huge sample makes the study more representative and enables the researchers to generalize their results to other universities in the country.

Table. 1.Research sample characteristics

| **Field of Study** | **Gender** | |
|---|---|---|
| | **Male** | **Female** |
| Basic Sciences | 714 | 2543 |
| Medical Sciences | 474 | 2317 |
| Engineering | 4277 | 3025 |
| Mathematics and Computer Sciences | 1028 | 1756 |
| **Subtotal** | 6493 | 9641 |

Data was collected from the university's registration department and then analyzed using the MS-Office Excel software tocalculate the percentages and frequenciesof graduates of every STEM field.

*Context of the study*

This study was conducted in one of the national public universities in Jordan, the Hashemite University. The Hashemite University is the second largest public university in Jordan with 29800 students in 2017 (Wikipedia, 2017). The university was established in 1995 and located in the vicinity of the city of Zarqa. It comprises 19 colleges (faculties) and institutes and offers (52) specialties at undergraduate level and (35) specialties at postgraduate level (doctorate, master, higher diploma, inaddition to a few professional diploma programs).

**Results**

Data showed a clear gendered pattern of graduates at the university level. Male students are the majority of those enrolled in engineering, Math, and computer sciences, and to a lesser extent in other disciplines Fig. 1, a & b). Female students represent the majority in Health sciences and basic sciences fields. The highest disparity appeared to be in Engineering fields where 58% of the graduates are males comparing to only 28% of female graduates. Data also showed that health sciences continue to be a favorite field of study for female students (29%) comparing to male graduates (11%). Similarly, basic sciences appeared to be significantly favored by female students (27%) comparing to only 13% of males graduating with a degree in basic sciences. Data also showed that Mathematics and Computer sciences are also favored by males (18%) comparing to only 16% of graduates are female.

Figure 1-a. Percentages of Males university graduates.

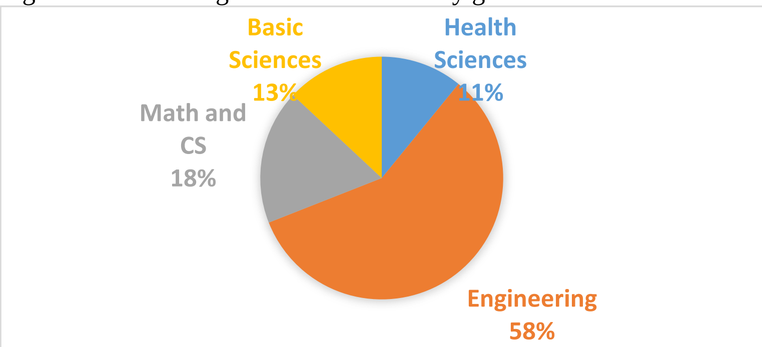
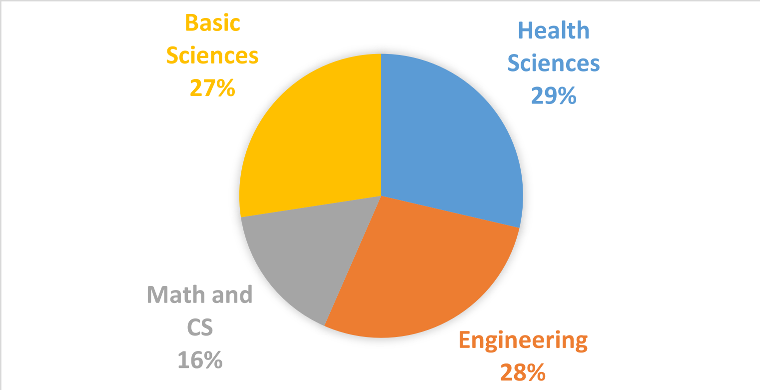
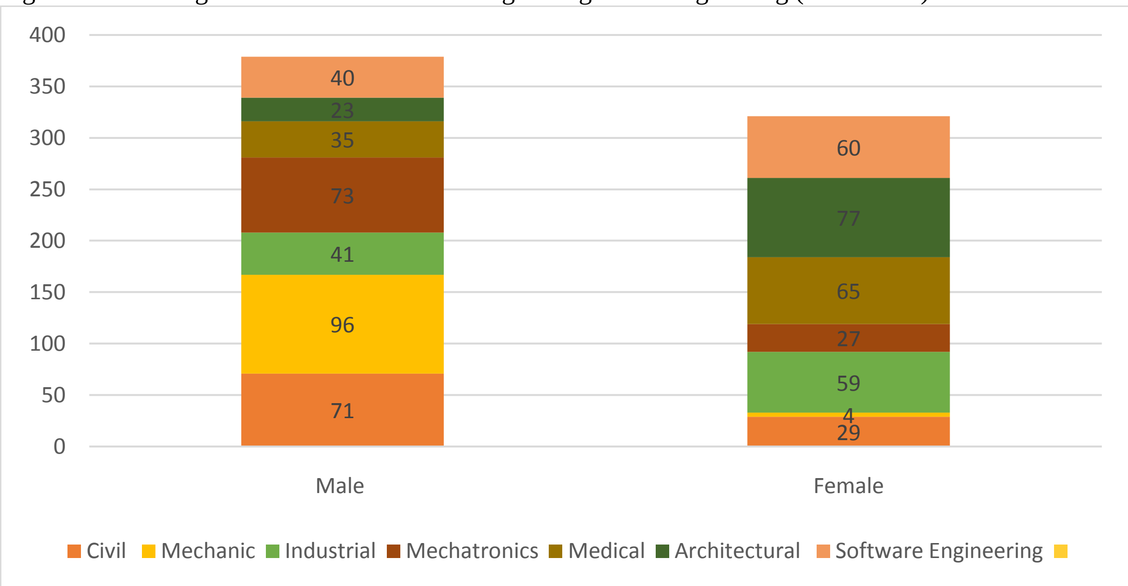



Figure 1-b. Percentages of Females university graduates.



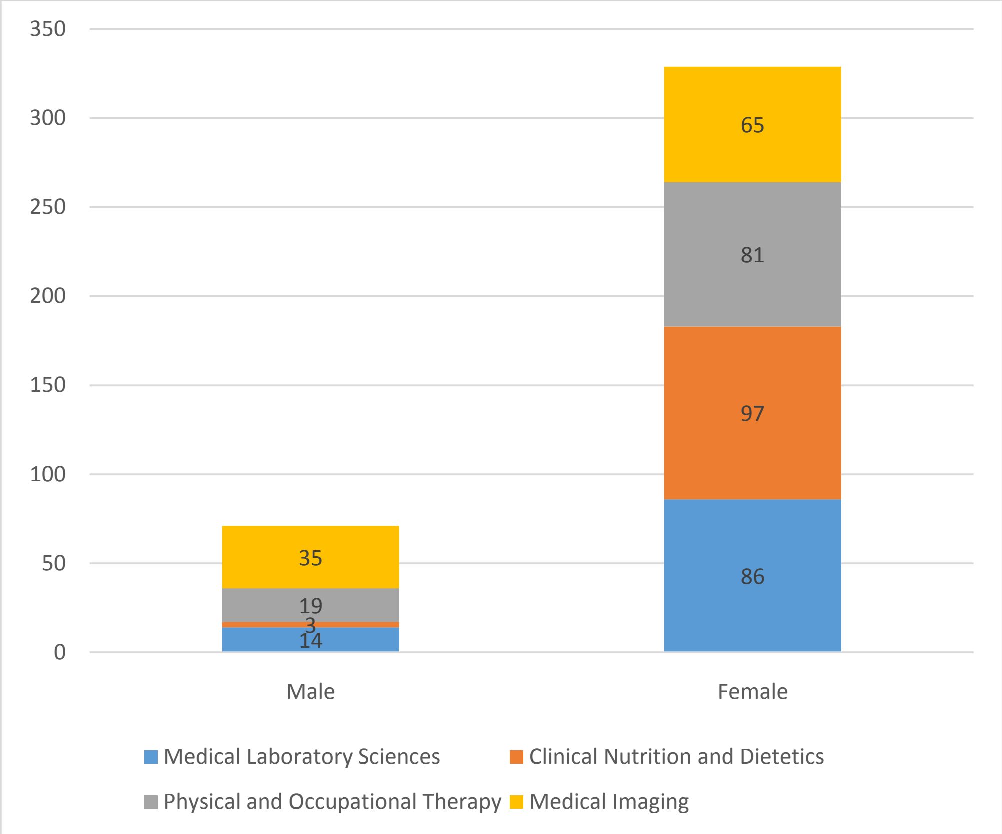

Data analysis indicated that the most favored fields of engineering by females were Architectural engineering (77%), Medical engineering (65%), Software engineering (60%), and Industrical engineering (59%). However, males favored mostly Mechanical engineering (96%), Civil engineering(71%), and mechatronics engineering (73%). See Fig. 2 below:

Figure 2. Percentages of male and female earnign a degree in Enigneering (2008-2018).



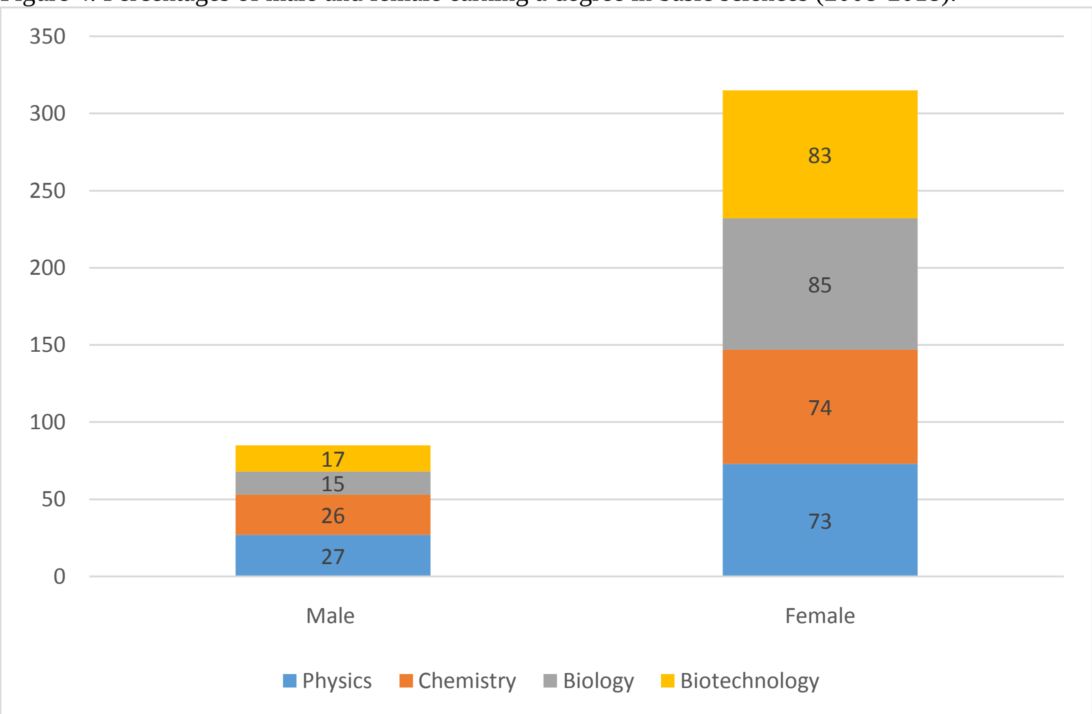

Data also revealed that the most favored fields ofhealth sciences by females were Clinical nutrition and dietetics (97%), Medical laboratory sciences (86%), Physical and occupational therapy (81%), and Medical imaging (65%). However only 35% of male graduates were in favor of studying Medical imaging, (19%) favored Physical and occupational therapy, (14%) favored Medical laboratory sciences, and only 3% studied clinical nutrition and dietetics (Fig. 3).

Figure 3. Percentages of male and female earning a degree in Medical sciences (2008-2018).



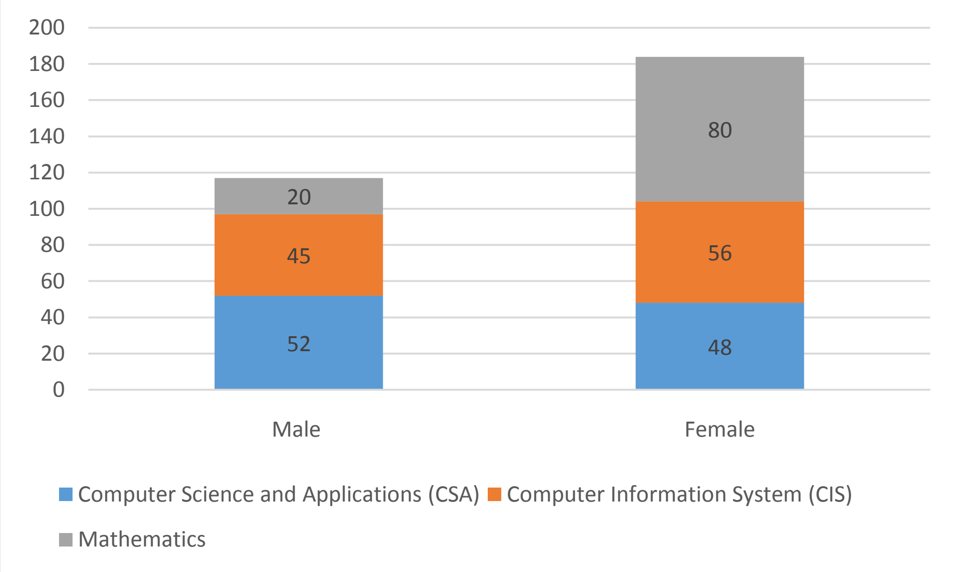

With respect to basic sciences, results showed that those fields are dominantly favored by females. As shown in Fig. 4, 83% and 85% of females studied Biotechnology and biologyfollowed by 74% and 73% studied chemistry and physics. On the contrary, Chemistry was the highest favored science by males (26%) followed by only 17% of males studied biotechnologyand only 15% of male graduates studied Biology.

Figure 4. Percentages of male and female earning a degree in basic sciences (2008-2018).




Similarly, computer sciences and mathematics were mostly studied by female graduates. As shown in Fig.5 below, (80%) of females studied Mathematics comparing to only 20% of male graduates. Likewise, computer information system (CIS) was also favored by female students (56%) comparing to (45%) males studied that subject. However, computer science and application seemed to be favored by both male and female students with a percentage of (52% and 48%) respectively.

Figure5. Percentages of male and female earning a degree in Mathematics and Computer sciences (2008-2018).




**Discussion**

The aforementioned resultsgenerally demonstrated the real status of STEM Education in Jordan and particularly among university graduates. Data showed that university male students are in favor of pursing a degree in almost every field of engineering except Architectural and Medical engineering. However, most female students study all fields related to Medical sciences, Basic sciences, and Mathematics. The only field of study that equally attracts both males and females is Computer sciences and applications.

These results reflect a striking disparity between the numbers of men and women in STEM education in Jordan. This gap disparity seems to be shaped by the classical social image of the job market preferencesthat favors to hire men to do certain jobs (i.e., Civil Engineering (96%)),while favors to hire women to do jobs related to medical fields such as (Clinical nutrition and dietetics, (97%), Medical laboratory sciences (86%), Physical and occupational therapy (81%), and Medical imaging (65%) as well asteaching related careers such as Biology (85%), Chemistry (74%), Physics (73%), and Mathematics (80%).

Research documents several explanations about gender disparities in STEM such as women's lack of ability due to their biological, innate, and/or immutable differences (Keller, 1985). However, recent studies give a role to the sociocultural factors that shape women's choice of study and career (Ceci et al.,2014). Some researchers argue that these sociocultural barriers that limit women's entrance and advancement in STEM education, mainly come from the prejudices held by men about women (UNESCO, 2017). However, other researchers (Moss-Racusin et al., 2012) argue that both men and women evaluators can be involved in gender discrimination and gender disparity. While the attention was previously put on the biases of other people evaluating the work of women, a more complex hypothesis also looks at biases within both women and men themselves, including their own preferences, biology, and social experiences that may encourage or discourage them from doing certain careers (e.g., Diekman et al., 2010).

Literature documentsthree majorcauses of gender disparity inSTEM (Greenwald et al., 1995, Keller, 1985, Ceci et al., 2014). One of these causes is attributed to the differences in abilities of both genders (Hyde, 2014), the second cause deals with differences in both gender preferences, values and lifestyle choices (Ceci et al., 2009, 2014; Ceciet al., 2011, Diekman et al., 2010), the third cause attributes the differences to the explicit and implicit bias among both genders themselves (Greenwald et al., 1995, General Social Survey, 2019). The following paragraphs provide more explanation of how these causes interplay and shape both genders' choice of study as well as their career choice.

During the early time of the past century, researchers thought that differences in both genders' ability in Mathematics is the most important factor that creates such disparity (Hyde, 2014). However, later during the 20th century, researchers figured out that the gender differences in Math abilities were rapidly closing (Feingold, 1988). Such new understanding was derived from the accumulation of the data about standardized tests (i.e., TIMSS, and PISA). This result was further supported by recent meta-analysis studies that showed that the gap between both gender in overall math abilities have significantly dropped. For example, researchers noted that the difference between US students in math abilities dropped to only *d*_0.0065, meaning that the differences between men and women on mathassessments are negligible (Hyde et al., 2008).

In Jordan, the OECD 2018 report showed that girls scored similar to boys in mathematics and girls outperformed boys in science by 29 score points. Additionally, some researchers argue that the culture could influence the performance of both genders in math (Else-Quest et al., 2010; Gray et al.,2019). However, the majority of researchers document that there is no convincing evidence that gender differences in math ability are immutable or biologically innate (Spelke, 2005; Ceciet al., 2010; Ceci et al., 2014; Hyde, 2016).

A second cause of variation in both genders' performance in STEM is their preferences, values and lifestyle choices (Ceci et al., 2009, 2014; Ceciet al., 2011). Or as Diekman et al., (2010) named it the "goal congruity hypothesis". The idea of Diekman et al., (2010) hypothesis is that women make the choice, to stay away from pursing a degree in STEM relying on both sociocultural pressures and innate psychological orientations. In other words, women see a mismatch between their goals and the nature of STEM education and environment which leads them to quit studying or working in STEM environments. Such conclusion was also proved in the OECD (2018) report about Jordan students' performance on PISA test, where amongst high-performing students in mathematics or science, about one in four boys in Jordan expect to work as an engineer or science professional at the age of 30, while one in nine girls expects to do so. Furthermore, the report indicates that about two in three high-performing girls expect to work in health-related professions, while about three in seven high-performing boys expect to do so. However, only 2% of boys and a negligible percentage of girls in Jordan expect to work in ICT-related professions (OECD, 2018).

Studies show that both genders' values and preferences arise during their early ages, when they both experience social pressures to play certain social roles, boys are expected to prefer competitive and active activities, while girls are expected to prefer communal and helping activities (Eagly, 1987). These socially influenced values impact both genders' future choices regarding their education as well as their social or academic preferences. Such influences encourage women to play communal, caring, and family roles while encourage men to perform self-serving, money, and status values (Ferriman et al., 2009; Su et al., 2009; Diekman et al., 2010; Weisgram et al., 2011).

Consequently, women tend to stay out of academic fields that are perceived to approve the status and competition (i.e, Engineering) and take more service, social, family, and helping roles (i.e, Medical sciences, teaching), while men tend to take competitive and high paying fields and jobs that align with their values (i.e, civil engineering) and stay away from other social and family roles that mismatch with their values (Meyer et al., 2015; Leslie et al., Freeland, 2015).

The third cause of gender disparity is attributed to both genders' explicit and implicit bias(Nosek and Smyth, 2007). While both explicit and implicit biases can be traced and identified throughout human responses, beliefs and actions, explicit bias is easy to identify where implicit bias is more automatic and requires certain instruments to trace and identify. Studies have shown that these biasescritically shape both genders' beliefs and behaviours and significantly contribute to link science to men and women to arts (Kurdi et al., 2019). Therefore, both explicit and implicit bias are important to understand to identify their impact on both genders' academic and career choices. For instance, research over the past two decades shows that gender bias in STEM is crucial and visible across genders, nations, and time. Such persistence of these biases matches the frequency of gender disparities in STEM career choice, gender representation, pay, and recognition (Nosek et al., 2009; Miller et al., 2015).

**OvercomingGender Disparity**

Overcoming barriers that hinder females from pursing their STEM education requirescomprehensive efforts that target the causes of gender disparity.The following paragraphs present some important programs and interventions that contribute to strengthen female capacities, enhance their social roles andvalues, and motivate them to pursue their universitySTEM education.

Probably one of the main causes that discourage Jordanian female students from continuing their STEM education is their preferences, values, and lifestyle choices. As mentioned above, females construct their self identity and values during their early ages, therefore, they need support to help them develop their STEM identity to be confident about themselves and pursue their STEM degrees. Such goals can be achieved by involving girls during their school ages in STEM camps, offering them focused workshops about STEM, and establishing STEM clubs at schools. The purpose of offering such activities is to expose female students to STEM from their early ages to advance their belonging (Archer et al., 2000) to science and math and mitigate the negative stereotypes about sex-based ability in math and science (Hill et al., 2010, Liu et al., 2014).

Additionally, exposing girls to female role models about STEM can significantly help them enhance their self perceptions and confidence towards STEM (Stout et al., 2011). For example, Nigerian girls were given opportunities to work with Nigerian women who were specialized in STEM. Such experience was found to encourage and retain Nigerian girls in STEM at all levels of their education (Duyilemi, 2008).

Furthermore, engaging female school students in real STEM experiences and activities can significantly motivate them and raise their self confidence. For example, results from a motivation study that was conducted on schoolgirls showed that girls performed better in math and science tests when they were told that they have the cognitive abilities that enable them to perform well in their exams (Hill, et al., 2010, Skolnik, 2015). Studies also suggested that girls who are more affected by gender stereotypes can significantly benefit from such STEM focused interventions (Wang, Degol, 2013).

Similarly, family-based, and peer-level interventions can greatly contribute to overcome the misconceptions that girls do better in arts but not in science or math (Gadzirayi et al., 2016). Carefully designed experiences (i.e., STEM awareness campaigns) that are designed for both parents and girls can have a huge impact on raising both parents and girls' awareness about STEM education and careers. When parents participate in such campaigns, they can play an active role in motivating their girls to engage in STEM activities and pursue their education in STEM fields (Burgard, 2003).

To further support the individual and family level interventions, educational institutions need to introduce system wide improvements. Such improvements should include revising the educational policies and regulations (i.e., admission policy) to encourage females to engage in studying STEM and develop their interest, confidence, and career goals. A study conducted by the IEA found that improvements that were introduced throughout twenty-year period to a number of education system across the world resulted into improvements in students' achievements in TIMSS results (Mullis et al., 2016).

Additionally, educational institutions need to recruit male and female teachers and faculty members who have the needed knowledge and skills about STEM education to help stimulate their students' interests and boost their motivation to learn about STEM. Consider hiring female teachers/faculty member can significantly influence female students' pursuit of STEM studies and careers. For example, countries like Austria, Belgium, Switzerland, Sweden and UK have prioritized hiring female STEM teachers to help motivate female students to pursue their education in STEM (Kearney, 2015).

Furthermore, both teachers and university faculty members need to have access to continuous professional development opportunities to advance their STEM knowledge and skills. Participating in such opportunities will strengthen their capacities to be more gender responsive and impact their students' interest and motivation in STEM (Mullis et al., 2016, Hill et al., 2010, OECD, 2015, &Savelsbergh et al., 2016). Relevant studies identified several teaching strategies that can improve female students' engagement, motivation, and attitudes towards STEM. These strategiesinclude inquiry-based learning, ICT based learning, and collaborative learning (Hill, et al., 2010, Baker, 2013, Rosenzweig, Wigfield, 2016, Leman et al., 2016., Wiest, 2014,EU, 2012, Savelsbergh, et al., 2016).

Moreover, revising school science curricula to make it more STEM oriented canhelp enhance female students' interest and engagement in STEM learning (Lyons, 2006). Curriculum revision should also remove any gender bias from the learning content, illustrations, images, and activities to make the curriculum more gender friendly.

In addition to that, reserving STEM scholarship for female students at the university level can enhance their engagement and learning in STEM. These scholarships could be offered by private sectors, companies, and factories to help encourage females to pursue their education in STEM.

One last thing to consider at the societal level, is to utilize media channels to promote positive images about women in STEM. Such utilization can significantly promote gender diverse representation in STEM (Steinke, 2017). The use of media can also contribute to eliminate stereotypes towards STEM (UNESCO, 2011).

**Conclusion**

In conclusion, gender disparity in STEM in Jordan appears to be mainly originated from differences in both gender preferences, values and lifestyle choices, and differences in the explicit and implicit bias among both genders themselves. Several interventions at the individual, family, school, and society level can be implemented to remove the impediments that discourage female students from pursing their education in STEM and ultimately from working in STEM careers. Urgent multisectoral efforts are needed to address gender disparity and spark women' interests and cultivate their ambitions to pursue STEM studies.

**References**

Al-Jaghoub, S., Westrup, C. (2003). Jordan and ICT-led development: towards a competition state? Inf Technol People. 16(1):93–110. doi:10.1108/09593840310463032

ArabDev. (2016). Education in Arab countries. Retrieved from http://www.arabdevelopmentportal.com/datahighlighted/education-attainment-arab-countries

Arabian Business Consultants for Development. (2017). The Jordan STEM Education Landscape A Report for the British Council.

Archer, L., Dewitt, J., Osborne, J., Dillon, J., Willis, B. Wong, B. (2010). “Doing” science versus “Being” a scientist: Examining 10/11-year-old schoolchildren’s constructions of science through the lens of identity. Science Education. 94(4): 617-639. DOI: 10.1002/sce.20399.

Baker, D. (2013). What works: Using curriculum and pedagogy to increase girls’ interest and participation in science. Theory into Practice. 52(1): 14-20, DOI: 10.1080/07351690.2013.743760.

Blickenstaff, J. C. (2005). Women and science careers: Leaky pipeline or gender filter? Gender and Education, 17(4),369-386. DOI: 10.1080/09540250500145072.

Brickhouse, N. W., Lowery, P. Schultz, K. (2000). What kind of a girl does science? The construction of school science identities. Journal of Research in Science Teaching. 37(5): 441-458. DOI: 10.1002/(SICI)1098-2736(200005)37:5<441::AID-TEA4>3.0.CO;2-3.

Burgard, B. N. (2003). An examination of psychological characteristics and environmental influences of female college students who choose traditional versus non-traditional academic majors. S. S. Hines (ed.), Advances in Library Administration and Organization, Vol. 20, Emerald Group Publishing Limited, pp.165-202.

Ceci, S., Ginther, D., Kahn, S., Williams, W. (2014). Women in academic science: A changing landscape. Psychological Science in the Public Interest. 15(3):75-141. DOI: 10.1177/1529100614541236.

Ceci S., Williams W. (2011). Understanding current causes of women’s underrepresentation in science. Proc Natl Acad SciU S A 108:3157–3162.

Ceci S, Williams. (2010) Sex differences in math-intensive fields. CurrDir Psychol Sci 19:275–279.

Ceci S, Williams WM., Barnett S. (2009). Women’s underrepresentation in science: sociocultural and biological considerations. Psychol Bull 135:218–261.

Deloitte. (2016). Women in STEM. Technology, Career Pathways and the Gender Pay Gap. London, Deloitte.

Diekman AB, Brown ER, Johnston AM, Clark EK. (2010). Seeking congruity between goals and roles: a new look at why women opt out of science, technology, engineering, and mathematics careers. Psychol Sci 21:1051–1057.

Duyilemi, A. (2008). Role modelling as a means of enhancing performance of Nigerian girls in science, technology and mathematics education. International Journal of Learning. 15(3), 227-234.

Eagly AH. (1987). Sex differences in social behavior. John M. MacEachran Memorial Lecture series, Vol 1985. Mahwah, NJ: Erlbaum.

Else-Quest NM, Hyde JS, Linn MC. (2010) Cross-national patterns of gender differences in mathematics: a meta-analysis. Psychol Bull 136:103–127.

European Commission. (2012). Meta-analysis of Gender and Science Research. Luxemburg, European Union.

EU. (2012). IRIS-Interests and Recruitment in Science. Factors Influencing Recruitment, Retention and Gender Equity in Science, Technology and Mathematics Higher. Retrieved from:https://cordis.europa.eu/project/id/230043

Feingold A. (1988). Cognitive gender differences are disappearing. Am Psychol. 43:95–103.

General Social Survey. (2019). GSS data explorer key trends. Retrieved from https://gssdataexplorer.norc.org/trends.

Ferriman K, Lubinski D, Benbow CP. (2009). Work preferences, life values, and personal views of top math/science graduate students and the profoundly gifted: developmental changes and gender differences during emerging adulthood and parenthood. J Pers Soc Psychol. 97:517–532.

Gadzirayi, C.T., Bongo, P. P., Ruyimbe, O., BhukuvhaniC. and Mucheri T. (2016). Diagnostic Study on Status of STEM Education in Zimbabwe. Binbura, Bindura University of Science Education and Higher Life Foundation.

Girl Scouts of the USA. (2016). How Girl Scout STEM Programs Benefit Girls. A Compilation of Findings From the Girl Scout Research Institute. New York, Girl Scouts of the USA.

Gray H., Lyth A., McKenna C., Stothard S., Tymms P., Copping L. (2019). Sex differences in variability across nations in reading, mathematics and science: a meta-analytic extension of Baye and Monseur (2016). Large-Scale Assess Educ. 7:1.

Greenwald AG., Banaji MR. (1995). Implicit social cognition: attitudes, self esteem, and stereotypes. Psychol Rev. 102:4 –27.

Hill, C., Corbett, C., St. Rose, A. (2010). Why So Few Women in Science Technology Engineering and Mathematics. Washington DC, American Association of University Women.

Hyde JS. (2014) Gender similarities and differences. Annu Rev Psychol. 65: 373–398.

Jordan Vision 2025. Retrieved from: https://www.greengrowthknowledge.org/sites/default/files/downloads/policy-database/JORDAN%29%20Jordan%202025%20Part%20I.pdf

Kearney, C. (2015). Efforts to Increase Students’ Interest in Pursuing Science, Technology, Engineering and Mathematics Studies and Careers. National Measures taken by 30 Countries - 2015 Report. Brussels, European School net.

Keller EF. (1985). Reflections on gender and science. New Haven, CT: Yale UP. Knobloch-Westerwick S, Glynn CJ, Huge M. (2013) The Matilda effect in science communication: an experiment on gender bias in publication quality perceptions and collaboration interest. Sci Commun 35:603– 625.

Kurdi B., Seitchik AE., Axt JR., Carroll TJ., Karapetyan A., Kaushik N., Tomezsko D., Greenwald AG.,Banaji MR. (2019) Relationship between the Implicit Association Test and intergroup behavior: a meta-analysis. Am Psychol 74:569 –586.

Leman, P., Skipper, Y., Watling, D., Rutland, A. (2016). Conceptual change in science is facilitated through peer collaboration for boys but not girls. Child Development, 87(1), 176-183. DOI: 10.1111/cdev.12481.

Leslie SJ., Cimpian A., Meyer M., Freeland E. (2015). Expectations of brilliance underlie gender distributions across academic disciplines. Science 347: 262–265.

Liu, Y. H., Lou, S. J., Shih, R. C. (2014). The investigation of STEM self-efficacy and professional commitment to engineering among female high school students. South African Journal of Education. 34(2): 01-15. DOI: 10.15700/201412071216.

Lyons, T. (2006). Different countries, same science classes: Students' experiences of school science in their own words. International Journal of Science Education.28(6): 591-613. DOI: 10.1080/09500690500339621.

Marginson, S., Tytler, R., Freeman, B., Roberts, K. (2013). STEM: Country Comparisons. Report for the Australian Council of Learned Academies (ACOLA). Melbourne, ACOLA.

Meyer M.,Cimpian A., Leslie SJ. (2015). Women are underrepresented in fields where success is believed to require brilliance. Front Psychol 6:235.

Miller DI., Eagly AH., Linn MC. (2015). Women's representation in science predicts national gender-science stereotypes: evidence from 66 nations. J Educ Psychol 107:631– 644.

Moss-Racusin CA., van der Toorn J., Dovidio JF., Brescoll VL., Graham MJ., Handelsman J. (2014). Scientific diversity interventions. Science 343:615–616.

Mullis, I. V. S., Martin, M. O., Foy, P., Hooper, M. (2016). TIMSS Advanced 2015 International Results in Advanced Mathematics and Physics. Retrieved from Boston College, TIMSS & PIRLS International Study Center website: http://timssandpirls.bc.edu/timss2015/international-results/advanced/

Mullis, I. V. S., Martin, M. O., Loveless, T. (2016). 20 Years of TIMSS. International Trends in Mathematics and Science Achievement, Curriculum and Instruction. Boston, IEA.

Nosek BA., Smyth FL. (2007). A Multitrait-multimethod validation of the implicit association test: implicit and explicit attitudes are related but distinct constructs. Exp Psychol 54:14 –29.

NSF. (2013). Women, Minorities, and Persons with Disabilities in Science and Engineering. Washington DC, National Science Foundation.

OECD, (2018). Jordan Country Note PISA 2018 Results. Retrieved from: https://www.oecd.org/pisa/publications/PISA2018_CN_JOR.pdf

OECD. (2016). PISA 2015 Results (Volume I): Excellence and Equity in Education. Paris, Organization for Economic Co-operation and Development.

OECD. (2015). The ABC of Gender Equality in Education: Aptitude, Behaviour, Confidence. Paris, Organization for Economic Co-operation and Development.

Author, A., Abuloum, A., Abu Al_Ruz, J. (2009). Effective integration of ICT in Jordanian schools: An analysis of pedagogical and contextual impediments in the science classroom. Journal of science education and technology. 18(2): 291-300.

Rosenzweig, E. Q.,Wigfield, A. (2016). STEM motivation interventions for adolescents: A promising start, but further to go. Educational Psychologists. 51(2): 146-163. DOI: 10.1080/00461520.2016.1154792.

Savelsbergh, E. R., Prinsa, G.T., Rietbergenb, C., Fechnera, S., Vaessena, B. E., Draijera, J. M.,Bakkera, A. (2016). Effects of innovative science and mathematics teaching on student attitudes and achievement: A meta-analytic study. Educational Research Review, 19: 158-172. DOI: 10.1016/j.edurev.2016.07.003. Education. http://cordis.europa.eu/result/rcn/54067_en.html

Skolnik, J. (2015). Why are girls and women underrepresented in STEM, and what can be done about it? Science & Education. 24(9-10): 1301-1306. DOI: 10.1007/s11191-015-9774-6.

Spelke. (2005). Sex differences in intrinsic aptitude for mathematics and science? A critical review. Am Psychol. 60:950 –958.

Steinke, J. (2017). Adolescent girls' STEM identity formation and media images of STEM professionals: Considering the influence of contextual cues. Frontier Psychology. DOI: 10.3389/fpsyg.2017.00716.

Stout, J. G., Dasgupta, N., Hunsinger, M., McManus, M. A. (2011). STEMing the tide: Using ingroup experts to inoculate women's self-concept in science, technology, engineering, and mathematics (STEM). Journal of Personality and Social Psychology. 100(2): 255. DOI: 10.1037/a0021385.

Su R., Rounds J., Armstrong PI. (2009). Men and things, women and people: a meta-analysis of sex differences in interests. Psychol Bull 135:859–884.

UN. (2016). Transforming our World: the 2030 Agenda for Sustainable Development. A/RES/70/1. New York, United Nations.

UNESCO. (2018). Work-Based Learning in Jordan. Retrieved from: https://en.unesco.org/sites/default/files/jordan_01_0.pdf

UNESCO. (2017). STEM and Gender Advancement (SAGA). http://www.unesco.org/new/en/natural-sciences/priority-areas/gender-and-science/improvingmeasurement-of-gender-equality-in-stem/stem-and-gender-advancement-saga

UNESCO. (2017). School Violence and Bullying. A Global Report. Paris.

UNESCO. (2016). Global Education Monitoring Report 2016: Education for People and Planet: Creating Sustainable Futures For All. Paris, UNESCO.

UNESCO. (2016). Incheon Declaration. Education 2030: Towards Inclusive and Equitable Quality Education and Lifelong Learning for All. Paris, UNESCO.

UNESCO. (2014). Girls' and Women's Right to Education. Overview of the measures supporting the Right to education for Girls and Women reported on by Member States. Paris, UNESCO.

UNESCO. (2011). Media and Information Literacy Curriculum for Teachers. Paris, UNESCO.

U.S. Government Accountability Office. (2015). Women in STEM research: better data and information sharing could improve oversight of federal grant-making and Title IX compliance, GAO-16–14. Washington, DC: U.S. Government Accountability Office.

Wang, M. T.,Degol, J. (2013). Motivational pathways to STEM career choices: Using expectancy-value perspective to understand individual and gender differences in STEM fields. Developmental Review, 33(4): 304-340. DOI: 10.1016/j.dr.2013.08.001.

Weisgram ES.,Dinella LM., Fulcher M. (2011). The role of masculinity/femininity, values, and occupational value affordances in shaping young men's and women's occupational choices. Sex Roles 65:243–258.

Wiest, L. R. (2014). Strategies for Educators to Support Females in STEM. Reno, University of Nevada.

Wikipedia (2017). Hashemite University. Retrieved from: https://en.wikipedia.org/wiki/Hashemite_University

World Bank. (2016). The Arab World. Retrieved from http://data.worldbank.org/region/arab-world retrieved April 6, 2017.

**Author Information**

**Omar Bataineh**
Department of Educational Foundations and Administration, Hashemite University, Jordan

**Ahmad Qablan**
Department of Curriculum& Instruction, University of Alberta, Canada &Hashemite university, Jordan