Gender Bias in Science, Technology, Engineering and Mathematics

Team Number 4

The Divide

Florida State University

LIS3201 – Fall 2021

Group Environmental Scan

Introduction

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The mark of a generation is largely tied to the tools they utilize. In the 19th century, the Industrial Revolution and coal-powered steam engines changed nearly every aspect of urban life, and similarly, the 21st century has its own toolage to thank for life-changing advances. In the modern world, society has largely normalized the interaction between humans and computers. It has become increasingly common to adopt technology in the home. For instance, in 2015, the National Center for Education Statistics (NCES) reported that around 85% of children ages 3 to 18 lived in households with access to a computer (KewalRamani et al., 2018). As such, 15% of this population has limited interaction with technology. The concept of a gap existing between the technology haves and the technology have-nots is commonly referred to as the digital divide. When considering the digital divide, it is common to cluster populations based on different classifiers. For the purposes of this study, the gendered digital divide will be analyzed. That is, this study aims to analyze the discrepancies between male technological adopters and female technological adopters. We believe that the effects of the digital divide can be associated with stereotypes surrounding women and their interaction with technology, as well as academic policies and practices, which can in turn affect outcomes for employability and workplace relations for the digitally marginalized.

Gender norms

The barriers for women to become involved with technology often reveal themselves through stereotypes concerned with the differences between men and women. These gender stereotypes can vary between cultures. For example, we will take note of the stereotypes about women in India who use cell phones. In 2018, a Harvard study determined that mobile phone usage for women in India carries cultural significance (Barboni et al., 2018). The research found that owning a mobile phone is viewed as a risk to the reputation of women, and their adoption of mobile phones is seen as a threat to their purity. For married women,

extensive mobile phone usage was found to be a sign that a woman is not taking proper care of her children (Barboni et al., 2018). These biases can lead to women neglecting the use of technology, but they can also be internalized and prompt women to believe that they are less skilled than their male counterparts. To illustrate that point, when asked to rate their ability in utilizing internet tools, men are nearly twice as likely to describe themselves as having an excellent grasp (Liff & Shepherd, 2004). Similar research reveals that female students report ratings of feeling less comfortable and less confident about computer usage when compared to their male classmates' responses. These same women expressed anxiety at the prospect of using computers, which they proclaimed led to feeling "inhibited to pursue careers in technology" (Cooper & Weaver, 2003). The biases concerning women's digital competency may provide an explanation for the lack of women entering Science, Technology, Engineering, and Mathematics (STEM) fields.

Education

Another explanation for why women make up less of the STEM workforce than men can be attributed to biases in education. In 2019, the Programme for International Student Assessment (PISA) surveyed the academic performance of 15 year old students in 67 countries. The survey found that 15 year old boys outperformed their female classmates in science assessments in 22 countries, while 15 year old girls outperformed their male classmates in science assessments in 19 countries (Mostrafa, 2019). For the remaining 26 countries, the performance differences in science assessments between boys and girls were deemed to be statistically insignificant. Across the board, the overall performance between 15 year old boys and girls was determined to be similar. As such, there is no clear intellectual advantage to indicate that men are more likely to aspire to scientific academic and post-academic pursuits due to their juvenile academic performance.

Yet, a disparity exists between men and women enrolled in STEM programs in higher education. On average, estimations have revealed that in 2019, 49% of women were expected to complete a university STEM degree. However, in reality, only 28% of women enrolled and completed a STEM degree (Mostrafa, 2019). This relationship reinforces the notion that women are less likely to participate in STEM programs. As far as computing degrees are concerned, McKinsey & Company found that 19% of students who received a computing degree were women (Lund et. al., 2019).

Workplace

The natural progression for college graduates is to seek employment in their field of expertise. Thus, it is logical that students who specialized in STEM fields during their education tend to gain employment in STEM positions. As a result, the gendered digital divide persists outside of academia and seeps into the workplace. In specific, a clear disparity arises between the gender split of male and female STEM workers. For example, McKinsey & Company reported that women hold only 26% of computing jobs in the United States, demonstrating a monstrous gap between the number of men employed in one STEM field versus the number of women (Lund et. al., 2019). Additionally, the trend of using and maintaining technology in the workplace results in the expectation that workers know how to use and are comfortable interacting with technology. In the near future, two of the top ten most sought after skills by employers will be "technology use, monitoring and control" as well as "technology design and programming" (World Economic Forum, 2020, p. 36).

Consequently, a large percentage of college educated women are at risk of not becoming equipped with the necessary skills to succeed in a changing job market. The shift to algorithmic and virtual workplace solutions is not only changing the soft skills that employers are looking for, but it is also disrupting the job market as a whole. The U.S. Bureau of Labor Statistics (BLS) employment projections report that on average, between

2019 and 2029, all occupations will see a 3.7% rise in job growth (Ice & Zilberman, 2021). The same projections noted that STEM related employment will see an 8.0% growth, more than doubling that of the job market average. Other sources estimate numbers for potential growth in STEM-related jobs as high as 37% by 2030 (Lund et. al., 2019). These changes will greatly benefit the digitally literate population, but the same cannot be said for the other portion of the digital divide. In essence, millions of women will lose the qualifications necessary to become employed in the changing world.

Conclusion

The digital divide is a permeating misfortune. One observable manifestation of the digital divide is that of gender. Our study aims to examine whether the array of stereotypes surrounding gender norms lead to biases in the academic experiences and outcomes of women. We believe that documenting and researching these experiences is important, as the result of women being less involved in STEM education can negatively impact their likelihood to be hired for STEM roles after graduating. These observations are valuable due to how fast the workplace is adopting technology and recruiting for more technically capable employees.

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Consent Form

Note: Use the table below to document each team member's contribution to this assignment.

Name	Contribution
Oliver Veras	Participated in verbal discussion, completed "workplace" subsection, reviewed and fixed APA.
Daniel Jaramillo	Participated in verbal discussion, completed "education" subsection, reviewed and fixed APA.
Brennan O'Hara	Participated in verbal discussion, completed the "education" subsection, reviewed and proofread the group scan.
Deven Ugalde	Participated in verbal discussion, completed "gender norms" subsection
Vanessa Sanbria	Participated in verbal discussion, completed "gender norms" subsection
Jamel Douglas	Participated in verbal discussion, completed "gender norms" subsection, reviewed and fixed APA.

Criteria	Rating
Completeness of the group environmental scan (7 pts): · Intro needs to include context of your topic (1 pts) and scope of environmental scan (1 pts) · Provision of 2-4 subsections (3 pts) · Conclusion needs to include key points summary (1 pts) and significance or unique contributions of your study (1 pts)	
Fluency of the group environmental scan (10 pts): · Using objective synthesized statements instead of article summaries or relevancy evaluations to organize your ideas for intro, subsections, and conclusion (7 pts) · Logical fluency by using transition sentences, structural writings, topic sentences, etc. (3 pts)	
Appropriateness of in-text citations for all arguments (2 pts)	

Formatting: · File name (1 pt) **Team 1_ES.doc(x)** · APA in-text citations and references (3 pts) · Match between in-text citation and references (1 pt) · Consent form (1 pt)	