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The Underrespresentation of Hispanic Women in the Science, Technology, Engineering, and Mathematics Fields: What Can Be Done to Curie the Problem.

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COMMENTS

THE UNDERREPRESENTATION OF HISPANIC WOMEN IN THE SCIENCE, TECHNOLOGY, ENGINEERING, AND MATHEMATICS FIELDS: WHAT CAN BE DONE TO "CURIE" THE PROBLEM?

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"Life is not easy for any of us. But what of that? We must have perseverance and above all confidence in ourselves. We must believe that we are gifted for something, and that this thing, at whatever cost, must be attained."[1]

—Marie Curie

Famous for her scientific accomplishments with radium, Marie Curie was not only the first woman to be honored with a Nobel Prize, but she was also the first to win two Nobel awards: one for her work in the field of physics and the other in the field of chemistry.[2] Unfortunately, today—over a century after Curie blazed an important trail for women in science—the possibility of becoming a scientist, engineer, or mathematician is a prospect that often may seem too far-fetched or even non-existent in the minds of many Hispanic women. This deficit of confidence in their ability to pursue educational and employment opportunities in the fields of science, technology, engineering, or mathematics (STEM or STEM fields) can be inferred from the glaring underrepresentation of Hispanic women studying and working in STEM fields today.

I. INTRODUCTION

Although Hispanic women comprise approximately eight percent of the U.S. population and represent the largest group of minority women, the demographic only constitutes approximately two percent of the science and engineering workforce.[3] In contrast, Caucasian women form approximately one-third of the population of the United States and comprise eighteen percent of the STEM workforce.[4] Hispanic women begin their post-secondary education with a proportional interest in STEM

1. E. CURIE, MADAME CURIE 158 (Da Capo Press ed., Doubleday, Doran & Co. 1986) (1937).

2. *Marie Curie Biography*, NOBELPRIZE.ORG, http://www.nobelprize.org/nobel_prizes/physics/laureates/1903/marie-curie-bio.html (last visited June 23, 2013); *Marie Curie Questions and Answers,* NOBELPRIZE.ORG, http://www.nobelprize.org/nobel_prizes/chemistry/laureates/1911/marie-curie-faq.html (last visited Aug. 16, 2013).

3. NATIONAL SCIENCE FOUNDATION, WOMEN, MINORITIES, AND PERSONS WITH DISABILITIES IN SCIENCE AND ENGINEERING: 2013 2, 8 (2013), *available at* http://www.nsf.gov/statistics/wmpd/2013/pdf/nsf13304_digest.pdf.

4. *See id.* To underscore the disparity, it is also worth noting that a large gap also exists between the representation of both minority and non-minority women and Caucasian men in the STEM arena. The report notes that Caucasian males make up thirty-one

fields as compared with other gender and ethnic or racial groups.[5] However, the lack of Hispanic women working in STEM fields post-education indicates that despite interest in STEM in the beginning of their post-secondary education, they are far less likely to continue with STEM coursework and ultimately earn a degree than their non-minority counterparts.[6] Such findings beg an important question: what is happening along the way? With greater general emphasis being placed on increasing U.S. students' participation and achievement in STEM fields,[7] it is crucial that schools be adequately funded and that teachers and education officials be able to prepare students for success in STEM fields. However, in pursuing higher participation and greater achievements in STEM fields, schools and education officials must also be more cognizant of the unique issues that underrepresented groups, including Hispanic women, potentially face as they pursue educational opportunities in STEM fields. While, in general, the areas of STEM are complex disciplines regardless of one's race or gender, the possibility of facing prejudice, discrimination,

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percent of the population of the United States yet comprise of fifty-five percent of the STEM workforce.

5. *See* Refugio I. Rochin & Stephen F. Mello, *Latinos in Science: Trends and Opportunities,* 6 J. OF HISPANIC HIGHER EDUC. 305, 315 fig.1 (2007) (presenting a graphical representation by Building Engineering and Science Talent based on data compiled by Joan Burrelli of the National Science Foundation). The graphic cites 1999 figures indicating that thirteen percent of minority women entering universities as freshmen exhibited interest in science and engineering. This is proportional as compared with population numbers and with the number of non-minority women graduating from high school and exhibiting interest in science and engineering as college freshmen. *Id.; see also* Girl Scouts of the United States of America, Generation STEM: What Girls Say About Science, Technology, Engineering, and Math 20 (2012), *available at* http://www.girlscouts.org/research/pdf/generation_stem_full_report.pdf (highlighting that teenage girls in minority groups exhibit an interest in STEM equal to teenage girls in non-minority groups). The study, conducted by the Girl Scouts Research Institute, also found that although the girls surveyed exhibited an equal interest in STEM across all ethnic groups, interest in particular areas of STEM was higher among Hispanic and African American girls versus Caucasian girls. *Id.* For example, where sixty-seven percent of Hispanic girls surveyed expressed an interest in "building things/putting things together," fifty-six percent of Caucasian girls surveyed expressed an interest in that same area. *Id.*

6. *See* NATIONAL SCIENCE FOUNDATION, *supra* note 3; *see also* Rochin & Mello, *supra* note 5 (showing that while thirteen percent of minority women entering university as freshmen exhibit an interest in science and engineering, only nine percent attain a bachelor's degree in a science- or engineering-related field).

7. *See* President's Council of Advisors on Sci. & Tech., *Prepare and Inspire: K–12 Education in Science, Technology, Engineering, and Math (STEM) for America's Future,* 1–2 (2010), http://www.whitehouse.gov/sites/default/files/microsites/ostp/pcast-stemed-report.pdf (predicting that, in the future, STEM fields will continue to have greater emphasis in schools due to American students' declining performance in these areas as compared to other students internationally and also because of the increasing role technology is expected to play in the economy and workforce).

or lack of resources only makes studying these subjects more difficult for Hispanic women.

While many explanations are given for the glaring underrepresentation of Hispanic women in STEM, this comment highlights the following: psychological tendencies, sex-based discrimination, income-based disparities between minority and majority students, deficiency of STEM-centered school curricula, lack of parental education and awareness regarding their child's capacity in STEM fields, and deficiency in suitable graduate-level and work-level environments in STEM departments to retain Hispanic women who have reached that stage.

How can we solve the problem of the underrepresentation of Hispanic women in STEM fields? We may find inspiration in a phrase commonly used in the sciences, which states that advances can be made by "standing on the shoulders of giants."[8] Using that mantra as a foundation, this comment will explore the gains that have been made thus far, will review what is currently being done to improve the situation for Hispanic women in STEM, and will make suggestions for further steps that must be taken to solve the problem of underrepresentation of Hispanic women in STEM fields.

Part II of this comment begins with a brief exploration of the history of Hispanic women in education and specifically in STEM fields. Next, Part III analyzes several of the root causes of underrepresentation of Hispanic women in STEM. Then, Part IV explores what is currently being done in the legal system to remedy the problem, the other methods being used outside of the legal system to remedy the problem, and whether the current methodologies speak directly to the causes of the problem. Finally, strategies are proposed to target the underrepresentation problem at various levels—early education, collegiate level, and post-collegiate level.

II. THE PATH THAT HAS LED TO TODAY'S UNDERREPRESENTATION OF MINORITY WOMEN IN THE SCIENCES

A. *The Uphill Battle: The Legal History of Hispanics and Women in Education and Employment*

Before exploring the legal issues that have influenced the participation of Hispanic women in STEM fields, it is important to underscore the hardships that Hispanics and women, respectively, have historically faced in both academic and work environments. Specifically, proper context requires exploration of inequality and discrimination frequently faced by each group.

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8. Letter from Sir Isaac Newton to Robert Hooke (Feb. 5, 1676), *in* 1 THE CORRESPONDENCE OF ISAAC NEWTON at 416 (H.W. Turnbull ed., 1959).

With respect to Hispanics, the history of segregation of Mexican American students from Caucasian students, especially in the southwest region of the United States, dates back to the mid-1800s.[9] The first Mexican American-initiated school desegregation case was decided in 1925,[10] and a series of similar desegregation cases in southwestern states ensued.[11] However, unless the cases were class action suits, rulings favoring desegregation had little effect on the Mexican American students in the surrounding community or state who were not parties to the particular cases.[12] Legislation was eventually passed in order to ensure racial and ethnic equality in educational settings. Such legislative measures were rooted in Title VI of the Civil Rights Act of 1964, which states that "[n]o person in the United States shall, on the ground of race, color, or national origin, be excluded from participation in, be denied the benefits of, or be

9. *See* RICHARD R. VALENCIA, CHICANO STUDENTS AND THE COURTS: THE MEXICAN AMERICAN LEGAL STRUGGLE FOR EDUCATIONAL EQUALITY 7 (2008) (stating segregation of Mexican American and Caucasian students began in the wake of the Mexican-American War and the signing of the Treaty of Guadalupe Hidalgo in 1848, which ceded to the United States control of present day Southwestern states).

10. *See id.* at 13–15 (2008) (citing *Romo v. Laird* as the first desegregation case initiated by a Mexican American against a school district). In the case, Adolfo Romo, Jr. filed the lawsuit against the Tempe Elementary School District and the superintendent of schools, William E. Laird. Romo asserted that the teachers at the school designated for "Spanish-Mexican" children were "inferior in attainments and qualification and ability to teach as compared with the teachers . . . in the other schools of District No. 3, in that they have not completed their education and course of training in the work of teaching." The court found in favor of Romo, noting, "The law will . . . and does require that, after children arrive at the school building, it be as good a building and as well equipped and furnished and presided over by as efficient corps of teachers as the schools provided for the children of other races."

11. *See, e.g.*, Mendez v. Westminister Sch. Dist. of Orange Cnty., 64 F. Supp. 544 (S.D. Cal. 1946), *aff'd sub nom.* Westminster Sch. Dist. of Orange Cnty., v. Mendez, 161 F.2d 774 (9th Cir. 1947) (holding segregation of Mexican American students from Caucasian students violated the students' rights to equal protection under the law as mandated by the Fourteenth Amendment to the United States Constitution). In this class action suit, the petitioner parents of Mexican American students alleged that the district's policy of segregating non-English speaking children from English speaking children was discriminatory and violated their children's equal protection rights. *Id.* at 545. The district court stated, "A paramount requisite in the American system of public education is social equality." *Id.* at 549; *see also* RICHARD R. VALENCIA, *supra* note 9, at 7–10 (describing generally Mexican American desegregation litigation in the Southwestern states from 1925 to the mid-1980s).

12. *See* RICHARD R. VALENCIA, *supra* note 9, at 22, 23 (distinguishing *Romo v. Laird*, where only the plaintiff's sons benefited from the litigation, with the class action lawsuit of *Mendez v. Westminster* which had a greater impact for the surrounding community and state).

subjected to discrimination under any program or activity receiving Federal financial assistance."[13]

Further legislation and policies, collectively known as affirmative action, have since been implemented to counter discrimination based on race or national origin (and other classifications) in education and employment.[14] The purpose of affirmative action is to ensure equal opportunities in education and employment for minority groups that have historically faced discrimination.[15] However, such legislation has not been implemented without challenges. For example, in recent years, the legislation pertaining to affirmative action in the university admissions process has stirred up much controversy in the courts.[16] However, as stated by education civil rights expert and minority advocate Professor Albert Kauffman, the laws pertaining to civil rights in education evolve as they go through multiple phases: detection and acknowledgment of the

13. Civil Rights Act of 1964, Pub. L. No. 88-352, tit. VI, 78 Stat. 241 (codified as amended in scattered sections of 2 U.S.C., 28 U.S.C., and 42 U.S.C.).

14. *See generally* ROBERT K. FULLINWIDER & JUDITH LICHTENBERG, LEVELING THE PLAYING FIELD: JUSTICE, POLITICS, AND COLLEGE ADMISSIONS 9–15 (2004) (reviewing the purpose and evolution of affirmative action in universities).

15. KENT GREENAWALT, DISCRIMINATION AND REVERSE DISCRIMINATION 17 (1983) (defining affirmative action as "a phrase that refers to attempts to bring members of underrepresented groups, usually groups that have suffered discrimination, into a higher degree of participation in some beneficial program"); *see also* ROBERT K. FULLINWIDER & JUDITH LICHTENBERG, *supra* note 15 (exploring the various elements that are often used in defining affirmative action).

16. *See, e.g.*, Gratz v. Bollinger, 539 U.S. 244 (2003) (holding the University of Michigan's College of Literature, Science, and the Arts could not use a system of giving automatic points to underrepresented minorities instead of making individually-based determinations); Grutter v. Bollinger, 539 U.S. 306 (2003) (upholding the use of affirmative action in the admissions policy of the University of Michigan Law School); Regents of Univ. of California v. Bakke, 438 U.S. 265 (1978) (ruling that the University of California Medical School's quota system was unconstitutional, but that race could be a factor considered by admissions staff at universities); Fisher v. Univ. of Tex., __ U.S. __, 133 S. Ct. 2411 (2013) (holding strict scrutiny is the burden to be applied in cases covering this topic); *see also* Jeffrey S. Lehman, *The Evolving Language of Diversity and Integration in Discussions of Affirmative Action from Bakke* to *Grutter*, *in* DEFENDING DIVERSITY: AFFIRMATIVE ACTION AT THE UNIVERSITY OF MICHIGAN 61–96 (2004) (reviewing the Supreme Court decisions in *Bakke*, *Gratz*, and *Grutter* and commenting on the progression of the Court's doctrine and its implications on the admissions process); *see also* Mark Walsh, *Eyes of US Are Upon Texas: Affirmative Action Case Kicks Off the Supreme Court's 2012 Term*, A.B.A.J., (Oct. 1, 2012), *available at* http://www.abajournal.com/magazine/article/eyes_of_us_are_upon_texas_affirmative_action_case_kicks_off_the_supreme?utm_source=maestro&utm_medium=email&utm_campaign=default_email (commenting briefly on the landmark decisions of the Supreme Court involving racial diversity preferences in university admissions and discussing how the Supreme Court's decision in the most recent Texas case may impact the future of such academic admission systems that use race as a factor in determining admissions).

civil right, strong legal support, a rise in opposition against the laws, and finally, reevaluation that may lead to changes in the laws.[17] Current controversies surrounding affirmative action in college admissions processes exemplify this cycle.[18]

Analogous to the rights prescribed by Title VI for racial and ethnic equality in federally-funded academic institutions, Title IX was subsequently implemented to ensure gender equality.[19] Title IX is most commonly credited with bridging the gender gap in school athletic programs[20] and employment environments.[21]

Applying Title IX to remedy the gender gap specifically in STEM fields has received more support in the recent years.[22] Currently, there is virtually no case law on the application of Title IX to ensure gender equality in STEM classrooms.[23] Moreover, as will be covered in further detail, STEM work environments have earned a reputation for poor retention rates of female employees.[24] In response, a variety of government re-

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17. Albert H. Kauffman, *Education and Minorities in the Modern Era: Working Civil Rights into Practice, Policy, and Procedure*, 12 SCHOLAR 347, 348–51 (2010).

18. *See, e.g.*, *Gratz*, 539 U.S. at 252 (striking the automatic point system employed by University of Michigan's College of Literature, Science, and the Arts); *Grutter*, 539 U.S. at 328 (upholding affirmative action in the admissions policy of the University of Michigan Law School); *Fisher*, 133 S. Ct. at 2415 (2013) (holding that strict scrutiny is the burden to be applied in cases covering this topic).

19. Education Amendments of 1972, Pub. L. No. 92–318, §§ 901–07, 86 Stat. 235, 373–75 (codified as amended at 20 U.S.C. §§ 1681–1688 (2006)).

20. *See* Zachary Nathan Klein, *Steming Out Disparities: The Challenges of Applying Title IX to the Study of Sciences, Technology, Engineering, and Mathematics*, 64 RUTGERS L. REV. 895, 901–04 (2012) (discussing the history and purpose of Title IX to emphasize potential application to STEM fields as opposed to traditional application for gender equality in athletics).

21. *See* Debra R. Rolison, *Title IX for Women in Academic Chemistry: Isn't a Millennium of Affirmative Action for White Men Sufficient?*, *in* WOMEN IN THE CHEMICAL WORKFORCE: A WORKSHOP REPORT TO THE CHEMICAL SCIENCES ROUNDTABLE: COMMISSION ON PHYSICAL SCIENCES, MATHEMATICS, AND APPLICATIONS (CPSMA) 74–93 (2000), *available at* http://www.nap.edu/openbook.php?record_id=10047&page=74 (advocating use of Title IX as part of efforts to increase the number of women working in science departments at universities).

22. *See* Klein, *supra* note 20, at 896 (discussing potential application of Title IX to STEM fields).

23. *See* Catherine Pieronek, *Title IX and Gender Equity in Science, Technology, Engineering and Mathematics Education: No Longer an Overlooked Application of the Law*, 31 J.C. & U.L. 291, 292 (2005) (discussing the underrepresentation of women in the STEM fields, and specifically noting that "[r]arely have courts examined gender equity in the academic context, as distinct from athletics or sexual harassment").

24. *See* SHIRLEY M. MALCOM ET AL., THE DOUBLE BIND: THE PRICE OF BEING A MINORITY WOMAN IN SCIENCE, AM. ASS'N FOR THE ADVANCEMENT OF SCI., NO.76-R-3 (1976) (describing factors such as lack of conduciveness to work-life balance and prejudice that contribute to the poor retention rates of women in scientific working environments).

ports have been published[25] and legislation[26] and directives have been passed[27] in recent years that specifically address the need for further support of women in the STEM fields.

The main federal agencies charged with implementing gender equality initiatives in STEM fields under Title IX are the Department of Education, the Department of Energy, the National Aeronautics and Space Administration (NASA), and the National Science Foundation (NSF).[28] Additionally, there are many other agencies and organizations that similarly advocate for the advancement of minorities in STEM.[29] Throughout this comment, several initiatives, reports, and programs from these agencies will be discussed in terms of their success in providing the appropriate solutions to counter the underrepresentation of Hispanic women learning and working in STEM fields.

B. *Hispanic Women in STEM Fields: Lack of Support for the Doubly Discriminated*

Ultimately, when considering the target groups impacted by Title VI and Title IX, the overlap of racial and gender discrimination reveals a doubly disadvantaged group—Hispanic women. Although the history of inequality experienced by this specific subset has not been largely publi-

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25. *See, e.g.*, U.S. GOV'T ACCOUNTABILITY OFFICE, GAO-04-639, GENDER ISSUES: WOMEN'S PARTICIPATION IN THE SCIENCES HAS INCREASED, BUT AGENCIES NEED TO DO MORE TO ENSURE COMPLIANCE WITH TITLE IX (2004) (exploring trends in women's participation in mathematics, engineering, and science fields, and evaluating Department of Education, Department of Energy, NASA, and NSF grant recipients' compliance with Title IX).

26. *See, e.g.*, Women's Educational Equity Act of 2001, 20 U.S.C. § 7283 (2006) (citing the continued inequity in science and math education between girls and boys as reasons for passing the Women's Educational Equity Act). The statute notes that "girls do not take as many mathematics and science courses as boys, girls lose confidence in their mathematics and science ability as girls move through adolescence, and there are few women role models in the sciences." *Id.* § 7283(b)(3)(C).

27. *See, e.g.*, Exec. Order No. 13506, 3 C.F.R. 13506 § 1 (2009) (establishing the White House Council on Women and Girls to address inequities in education and employment opportunities for women and girls, with special emphasis on increasing female participation in science, engineering, and technology).

28. U.S. GOV'T ACCOUNTABILITY OFFICE, *supra* note 25, at 1.

29. *See, e.g.*, EXPANDING YOUR HORIZONS NETWORK: MOTIVATING YOUNG WOMEN IN SCIENCE AND MATHEMATICS, http://www.expandingyourhorizons.org/about/organization/intro/ (last visited June 28, 2013) (offering young women the opportunity to network with women working in the sciences at various events and conferences); SOUTHWEST INSTITUTE FOR RESEARCH ON WOMEN, http://sirow.arizona.edu/ (last visited Aug. 25, 2013) (offering young Hispanic and American Indian students the opportunity to learn more about various scientific fields through special events).

cized in textbooks, media, or the courtrooms, there is some documented history of the hardships Hispanic women have faced in STEM fields.[30]

The first documented meeting in which female minority scientists discussed the "double oppression of sex and race or ethnicity, plus the third oppression in the chosen career, science"[31] took place in Warrenton, Virginia in 1975 and was supported by the NSF.[32] This landmark meeting resulted in a report published by the American Association for the Advancement of Science (AAAS) titled "The Double Bind: The Price of Being a Minority Woman in Science" (Double Bind Report).[33] The report compiled the meeting information and provided recommendations for solving the problem of racial and gender discrimination in the sciences.[34] The various chapters of the report discuss the experiences faced by female minority scientists at different stages of their lives, from precollegiate, to collegiate and graduate studies, to professional career, and ultimately proposed policies and programs to aid this group of women in overcoming the obstacles that hindered their success in STEM fields.[35] The Double Bind Report functions as a significant starting point from which to analyze the progress that has been made since 1975 and to examine what needs to be improved.

Because this comment focuses on the legal solutions currently employed to remedy the underrepresentation of Hispanic women in STEM fields, legal history is an important foundational element. Interestingly, there is a lack of case law that speaks directly to this double minority group. Federal commissions have been formed,[36] and federal[37] and state

30. MALCOM ET AL., *supra* note 24, at vii (declaring that, as of the 1975 conference report, "[t]here was little information available on the status of minority women in science and virtually no literature that would advise institutions on the nature of the problems or the remedies").

31. *Id.* at ix.

32. Am. Chem. Soc'y, *Minority Women Still Most Underrepresented in Science Despite Progress*, PHYS.ORG (Mar. 27, 2012), http://phys.org/news/2012-03-minority-women-underrepresented-science.html#jCp (quoting MALCOM ET AL., *supra* note 24, at ix).

33. MALCOM ET AL., *supra* note 24.

34. *Id.* at 11–14.

35. *Id.* at vii.

36. *See, e.g.*, CONG. COMM'N ON THE ADVANCEMENT OF WOMEN & MINORITIES IN SCI., LAND OF PLENTY: DIVERSITY AS AMERICA'S COMPETITIVE EDGE IN SCIENCE, ENGINEERING, AND TECHNOLOGY, at iii (2000), *available at* http://www.nsf.gov/pubs/2000/cawmset0409/ cawmset_0409.pdf (explaining in detail the history of the Commission). The U.S. Congress formed the Commission in the late 1990s to study the status of women, underrepresented minorities, and people with disabilities in the sciences. *Id.* Based on their analysis, the Commission made recommendations for ways to recruit and retain women, minorities, and people with disabilities in science-based careers. *Id.* at iii–iv. The Commission's term has since ended.

laws[38] have been passed, that are focused on studying both women and minorities in STEM fields. However, there are a limited number of currently-active programs specifically designed to elevate the status of minority women, including Hispanic women. Thus, a fundamental question emerges: How much legislation pertaining to Hispanic women in STEM fields is *study* and how much is *action*? Because much of the published findings of Congress and state programs focus on "findings and intent," this comment will analyze the actual undertakings or actions currently in place, how successful they are, and what modifications are needed.

III. Analyzing the Problem: Potential Causes, Currently Employed Remedies, and Prospective Changes for the Future

A. *Getting to the Roots of the Problem: Why are Hispanic Women Gravely Underrepresented in STEM fields?*

Before determining the best method to elevate the status of these double minorities, it is crucial to determine the origins of the problem. The distinct group of Hispanic women falls into the overlap of two categories of minorities in STEM fields.[39] However, although they fall into

37. *See, e.g.*, 20 U.S.C. § 5364 (repealed 1994) (addressing the gap in participation of women and minorities in math, science, and engineering).

38. *See, e.g.*, Tex. Educ. Code Ann. § 51.601 (West, Westlaw through 2011 Sess.) (enacting legislation to reinforce recruiting of women and minorities into science and engineering-related fields); Tex. Educ. Code Ann. § 51.604 (West, Westlaw through 2011 Sess.) (allocating funds from the Engineering and Science Recruitment Fund toward the establishment and operation of programs to assist women and minority groups in pursuing undergraduate degrees in the engineering or science fields); Wash. Rev. Code § 28A.625.200 (West, Westlaw through 2012 legislation) (finding that women and minority groups are underrepresented in the science, math, and technology fields in Washington State and noting the legislature's intended efforts to open opportunities to these groups); W. Va. Code Ann. § 18B-14-11 (West 2005) (establishing in the state of West Virginia the Governor's Commission on Graduate Study in Science, Technology, Engineering, and Mathematics to help the state become more competitive in these areas, and also to broaden opportunities for women and minority groups in these fields); W. Va. Code Ann. § 18C-6-3 (West 2005) (outlining the requirements for a scholarship program for students pursuing studies in STEM fields).

39. *See* Women's Educational Equity Act of 2001, 20 U.S.C. § 7283 (2006) (acknowledging that while women and girls have made strides since Title IX was passed, inequities continue to exist in education); *see also* Exec. Order No. 13506, 3 C.F.R. 13506 (2009) (establishing the White House Council on Women and Girls to address the inequities in education that affect women and girls, specifically in the areas of science and technology); *see also* National Science Foundation, *supra* note 3 (affirming that women continue to be underrepresented in the sciences); *see also* U.S. Gov't Accountability Office, *supra* note 25 (noting that, while women have made gains in education and employment in science-related fields, they still lag behind their male counterparts in pay and rank, and also do not pursue graduate studies at the same rates); *see also* Catherine Pieronek, *supra* note 23 (noting disparity between men and women's rates of attaining engineering degrees).

this minority group because of gender, Hispanic women may differ greatly in background and culture from a large portion of the entire female population and thus may have difficulty identifying with them.[40]

Although ethnic and racial minorities as a whole are underrepresented in the STEM fields,[41] a large disparity may exist between the background and culture of Hispanics as compared to other ethnic minorities.[42] Moreover, Hispanic women have an added gender disadvantage within this populace.[43] These distinctions may be key to unlocking the dilemma that Hispanic women face as double minorities.[44]

The author notes that of the 59,258 bachelor's degrees given in engineering in 2001, only 11,914 were granted to women. *Id.*; *see also* Debra R. Rolison, *supra* note 21 (describing disproportionate underrepresentation of women in science and engineering).

40. *See* Sandra L. Hanson, *Lessons from Multi-Cultural Feminism for Changing Science and Engineering*, *in* THE ACCEPTANCE AND DIFFUSION OF INNOVATION: A CROSS-DISCIPLINARY APPROACH TO INSTRUCTIONAL AND CURRICULAR CHANGE IN ENGINEERING 55, 60 (2007) (suggesting that "[o]rganizations, agencies, and individual researchers need to collect and present data on science and engineering that go beyond white versus black and male versus female contrasts. Acknowledgment of the variations within race groups (by gender) and within gender groups (by race) is needed."). *Compare id.* at 57 (summarizing the theory that African American women embrace a culture in which they are traditionally expected to raise a family and work), *with* MALCOM ET AL., *supra* note 24, at 34 (conveying the sentiment of Mexican American scientists by stating that "[w]omen had been taught to give priority to family needs and concerns, assume responsibility for most domestic functions, and respect the authority of the man as head of the household and spokesperson for the family to the 'outside world.'").

41. *See* National Science Foundation, *supra* note 3; *see also* Nat'l Action Council on Minorities in Engineering, Inc., *Critical Issues in Engineering Education Policy*, 2 RES. & POL'Y 1 (2012); *see also* Stanley Litow, *A Silent Crisis: The Underrepresentation of Latinos in STEM Careers*, EDUC. WEEK (July 17, 2008), *available at* http://www.edweek.org/ew/articles/2008/07/18/44litow-com_web.h27.html.

42. *See* MALCOM ET AL., *supra* note 24, at 34 (discussing the impact of traditional Hispanic gender roles).

43. *See* Susan R. Sy & Jessica Romero, *Family Responsibilities Among Latina College Students From Immigrant Families*, 7 J. HISPANIC HIGHER EDUC. 212, 218–21 (2008) (explaining results of a study on Hispanic women regarding their unique family responsibilities and how these obligations may hinder their retention in higher education). The study finds three main reasons relating to family responsibilities: "the importance of developing self-sufficiency to support the family, the voluntary nature of their financial contributions, and their role as a surrogate parent for younger family members." *Id.*

44. *See* Symposium, *Unraveling the Double Bind: Women of Color in STEM*, 81 HARV. EDU. REV. 157, 158 (2011) (describing the mislabeling of minority women as "either an issue of race and ethnicity or gender" and further adding that "[t]hirty-five years after The Double Bind [landmark report], research on this issue has not evolved in ways that allow us to fully understand and communicate the unique ways that race, ethnicity, and gender intersect in the experiences of these students"); *see also* MALCOM et al., *supra* note 24, at vii (explaining that minority women are cognizant of differences and commonalities with minority male scientist, majority women scientists, and others).

In 1976, NSF and AAAS researchers found that the unique situations faced by minority women scientists had never before been addressed and that "minority women were, in fact, falling somewhere in between the funded efforts to improve science opportunities for minorities and efforts to advance women in science."[45] Additionally, the Double Bind Report succinctly described the status of minority women in the sciences in the following manner:

> Programs for minorities and women have generally been assumed to include minority women, but in fact minority women fall in the cracks between the two. The programs designed to increase the number of women in science have been largely devoted to assisting majority women. The programs developed for minorities in science have mostly been dominated by male scientists. Similarly, the women's science organizations are overwhelmingly white, and the minority science organizations, overwhelmingly male.[46]

Finally, it has also been emphasized that these women face a third, overarching disadvantage because they have selected an educational or career path in a challenging STEM field.[47]

In searching for potential remedies for this underrepresentation, we must first explore the barriers that may be obstructing Hispanic women's paths to success in STEM disciplines. Potential causes of this problem have been hypothesized throughout the years and through many different studies;[48] however, despite the various studies that have been published, a definitive cause has yet to be determined.[49] It has been hypothesized

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45. MALCOM ET AL., *supra* note 24, at vii; *see also Unraveling the Double Bind: Women of Color in STEM*, *supra* note 44 (explaining the unique subset of minority women and how studies have mistakenly "treat[ed] these women of color discretely; it is either an issue of race and ethnicity or gender").

46. MALCOM ET AL., *supra* note 24, at 1.

47. *See id.* at ix (noting the oppressive trifecta of being an ethnic minority woman in science); *see also* Am. Chem. Soc'y, *supra* note 32.

48. *See, e.g.*, Catherine Riegle-Crumb & Barbara King, *Questioning a White Male Advantage in STEM: Examining Disparities in College Major by Gender and Race/Ethnicity*, 39 EDUC. RESEARCHER 656, 656–64 (2010) (studying disparities between genders and races/ethnicities in STEM education); *see also* Stephen J. Ceci & Wendy M. Williams, *Understanding Current Causes of Women's Underrepresentation in Science*, 108 PROC. NAT'L ACAD. SCI. U.S. 3157 (2011) (exploring past theories of the underlying causes of women's underrepresentation in science); Maggie Severns, *Study Offers Possible Explanation for the Huge Gender Gap in Science and Math*, SLATE (June 14, 2012, 4:17 PM), http://www.slate.com/blogs/future_tense/2012/06/14/stem_ gender_gap_research_on_telling_girls_they_re_bad_at_math_.html (discussing possible reasons for the gender gap in science and math).

49. *See* Am. Chem. Soc'y, *supra* note 32 (describing the overall progress of minority women in STEM in the last thirty-five years); *see also* Catherine Pieronek, *supra* note 23, at 292 (discussing various theories that have attempted to explain the large gender gap).

that the potential causes include, among numerous others, psychological tendencies, sex-based discrimination, income-based disparities between minority and majority students, deficiency of STEM-centered school curriculum, lack of parental education and awareness regarding their child's capacity in STEM fields, and deficiency in suitable graduate-level and work-level environments in STEM departments to retain Hispanic women who have reached that stage.[50]

The timeless argument that places blame on psychological tendencies for the gender gap in the STEM fields is one that will not be discussed here in detail; however, it is worth mentioning that societal proclivities, such as association of males with science,[51] may also play a part in the underrepresentation of Hispanic women in STEM fields. In order to effect change and alter the common mindset on the subject of women in STEM, more women across the board must be employed in these fields.[52] Having more women, including minority women, in STEM careers and acting as role models and mentors for other women will help dispel the notion of a male-driven science world[53] Due to the perpetuation of these stereotypes, sex-based discrimination may also be a factor in the under-

50. *See* Rochin & Mello, *supra* note 5, at 314 (echoing concern for the same or similar list of issues that affect Hispanic men and women and prevent them from entering into and succeeding in STEM fields).

51. *See* Londa Schiebinger, *Getting More Women into Science: Knowledge Issues*, 30 HARV. J.L. & GENDER 365, 365–67 (2007) (describing a trend throughout the recent decades in which the majority of students depicted scientists as male); *see also* SUSAN PINKER, THE SEXUAL PARADOX: MEN, WOMEN, AND THE REAL GENDER GAP 85 (2008) (highlighting a "consistent, statistical sex difference" in female and male occupations, in which women prefer working with "people and living things" and men prefer working with "inanimate objects and physical processes"); *see also* Kingsley R. Browne, *Evolved Sex Differences and Occupational Segregation*, 27 J. ORG. BEHAV. 143, 150 (2005) (noting a trend that women are more attracted than men to fields having higher social dimensions).

52. *See* Mark Muckenfuss, *REGION: Women Battle Hiring Bias in Science, Math Fields*, THE PRESS-ENTERPRISE (Dec. 10, 2012, 5:27 PM), http://www.pe.com/local-news/riverside-county/riverside/riverside-headlines-index/20121210-region-women-battle-hiring-bias-in-science-math-fields.ece (quoting a chemical and environmental engineering professor who believes that changing current mindset will take a cultural shift).

53. *See* Katy Hopkins, *College Mentors Key to Prospective Female STEM Majors*, U.S. NEWS & WORLD REPORT (May 31, 2012), http://www.usnews.com/education/high-schools/articles/2012/05/31/college-mentors-key-to-prospective-female-stem-majors (featuring stories on college females serving as mentors to high school girls to boost interest in STEM, and quoting Suzanne Sontgerath, Assistant Director of Admissions at Worcester Polytechnic Institute, as stating that "[p]robably one of the biggest motivating factors . . . is the use of role models and what role modeling can do for these women in terms of actually being able to visualize themselves in those types of careers").

representation of Hispanic women in STEM, but is not considered to be the sole factor itself.[54]

A significant aspect closely associated with a poor STEM-centered school curricula and parental education is that of income-based disparities among minority groups, including Hispanic women, and non-minority groups. The Chief Executive Officer of the American Indian Higher Education Association, Carrie Billy, aptly stated that "[p]overty is one of the more debilitating barriers minority students face . . . generation after generation after generation of extreme poverty that leads to depression and stress, and the inability to even want to go on to get a higher education."[55] Other reports have found that aside from this lack of optimism, minorities are hindered (and will continue to be hindered) from aspiring to study STEM because they most commonly attend poorer schools with greater poverty rates, and are thus exposed to lower-level resources.[56]

In the Double Bind Report, when asked about the troubles experienced by minority women scientists during their early educational years, the female scientists shared that "[t]he problems . . . in this period of their lives were largely due to race or ethnicity and/or poverty."[57] Although many advocates for equal resources in all schools have found success in courtrooms, through legislation, and via scholarly articles,[58] the problem

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54. *See* Ellen Daniell, Every Other Thursday: Stories and Strategies from Successful Women Scientists xxii (2006) (explaining conclusions of sociologist Dr. Yu Xie and other researchers). The sociologist quipped "over the past few decades there has been a steady increase in women's participation in the sciences and engineering." *Id.* Because the genetic pool has not changed in that time, factors like improved educational conditions for women and efforts to reduce discrimination are much likelier explanations." *Id.*

55. Kelsey Sheehy, *Minorities Need STEM Role Models Too*, U.S. NEWS & WORLD REPORT (June 28, 2012), http://www.usnews.com/news/blogs/stem-education/2012/06/28/minorities-need-stem-role-models-too.

56. *See* Hanson, *supra* note 40, at 61 (summarizing several schools of thought on low minority enrollment and retention in STEM fields); *see also* James W. Ainsworth-Darnell & Douglas B. Downey, *Assessing the Oppositional Culture Explanation for Racial/Ethnic Differences in School Performance*, 63 AM. SOC. REV. 536, 551 (1998) (stressing that African American students will not perform at the same level as Caucasian students "until they enjoy comparable material conditions"); *see also* Chantelle Archer, *Economic Disparities Undermine Equal Education For All*, HARTFORD COURANT (Oct. 5, 2011), http://articles.courant.com/2011-10-05/news/hc-op-archer-fresh-talk-1005-20111005_1_standardized-tests-lowest-performing-schools-school-districts (describing the privileged versus underprivileged dichotomy in schools).

57. MALCOM ET AL., *supra* note 24, at 6.

58. *See* Meaghan Field, Note, *Justice As Fairness: The Equitable Foundations of Adequacy Litigation*, 12 SCHOLAR 403, 407 (2010) (focusing on result-oriented objectives even if additional resources are required to reduce disparity); *see also* A QUALITY EDUCATION FOR EVERY CHILD: STORIES FROM THE LAWYERS ON THE FRONT LINES (David Long et al. eds., 2009) (reviewing a collection of cases involving educational funding and equal resources for schools); *see generally* Albert H. Kauffman, *The Texas School Finance Litiga-*

of low income and pervasive poverty in minority-concentrated schools persists, begetting other serious problems for minorities.[59]

A deficiency of STEM-centered school curricula is one such area of concern that results from less available resources in lower-income schools. Although many schools lack suitable science labs,[60] schools that primarily consist of poor or minority students are even more susceptible to having a lesser-quality or no science laboratories at all.[61]

Additionally, in recent years, schools with a predominantly minority student population and lower-income schools have experienced a shortage of teachers who are certified to teach science-based curricula, which has resulted in detrimental effects on the students.[62] For example, a recent study showed that in high-poverty schools, approximately twenty-five percent of seventh through twelfth grade mathematics classes

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tion Saga: Great Progress, Then Near Death by a Thousand Cuts, 40 ST. MARY'S L.J. 511, 513–14 (2008) (examining six Texas Supreme Court decisions concerning school funding and the progress that has been made over the years with regard to equity in school resources).

59. *See* Linda Darling-Hammond & Laura Post, *Inequality in Teaching and Schooling: Supporting High-Quality Teaching and Leadership in Low-Income Schools*, *in* A NOTION AT RISK: PRESERVING PUBLIC EDUCATION AS AN ENGINE FOR SOCIAL MOBILITY 127–28 (Richard D. Kahlenberg, ed., 2000) (emphasizing that "[p]oor and minority students are concentrated in the less well funded schools" and that this leaves "minority students with fewer and lower-quality books, curriculum materials, laboratories, and computers; significantly larger class sizes; less qualified and experienced teachers; and less access to high-quality curriculum"); *see also* Gary Orfield & John T. Yun, *Resegregation in American Schools*, THE CIVIL RIGHTS PROJECT, HARVARD UNIV., June 1999, at 3 (asserting that "[w]hen African-American and Latino students are segregated into schools where the majority of students are non-Caucasian, they are very likely to find themselves in schools where poverty is concentrated"); *see also* Julianne Hing, *Still Separate and Unequal, Generations After* Brown v. Board, COLORLINES (May 17, 2011, 10:10 A.M.), http://colorlines.com/archives/2011/05/brown_v_board_of_education_feature.html (citing studies that reveal that highly-concentrated Black and Hispanic schools are most often also high in poverty as well).

60. *See* Ron Schachter, *School Science Labs: Some Districts Bite the Bullet to Update their Antiquated Facilities*, DISTRICT ADMINISTRATION (Nov. 1, 2008, 12:00 A.M.), http://www.districtadministration.com/article/school-science-labs (describing the state of disrepair of many school science labs across the United States).

61. *See* Darling-Hammond & Post, *supra* note 59 (emphasizing that "[p]oor and minority students are concentrated in the less well funded schools" and that this leaves "minority students with fewer and lower-quality books, curriculum materials, laboratories, and computers; significantly larger class sizes; less qualified and experienced teachers; and less access to high-quality curriculum"); *see also* Charles J. Dean et al., *Held Back: Poverty Hobbling Students*, BIRMINGHAM NEWS (Oct. 27, 2002), http://www.al.com/specialreport/birminghamnews/index. ssf?blackbelt/blackbelt17.html (disclosing the personal story of an Alabama student who attends a poverty-stricken school with no science lab).

62. *See* Darling-Hammond & Post, *supra* note 59 (asserting teacher quality may be the largest educational differential between Caucasian and minority students).

are instructed by non-certified teachers, as compared to approximately eleven percent in low-poverty schools.[63] Further, it has been found that minority students indeed benefit from having minority teachers as role models, which would be especially beneficial for teachers in STEM fields.[64] Unfortunately, there are a low number of minority schoolteachers as compared to minority students in schools.[65]

Finally, with respect to mathematics curricula, the U.S. Department of Education found that "only twenty-nine percent of high-minority high schools offered Calculus, compared to fifty-five percent of schools with the lowest black and Hispanic enrollment," and while sixty-five percent of high schools with high minority enrollment offered classes such as Algebra II, this number was staggeringly low compared to the eighty-two percent offered by schools with low minority enrollment.[66]

Thus, one may well ask how minority students' interest in the challenging world of STEM could ever be ignited if they have never been exposed to science, technology, engineering, or math-based courses early in their education? Because of this deficiency, not only will students be underprepared for STEM studies, but they may also be entirely deterred from entering into any STEM field.[67]

At the collegiate level, minority-serving and women's universities have also had histories of being less equipped to prepare their students for graduate studies and professional careers in STEM.[68] To address such

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63. Sarah Almy & Cristina Theokas, *Not Prepared for Class: High Poverty Schools Continue to Have Fewer In-Field Teachers*, EDUC. TRUST 2 (Nov. 2010), *available at* http://www.edtrust.org/sites/edtrust.org/files/publications/files/Not%20Prepared%20for%20Class.pdf.

64. *See STEMistic: In Short Supply*, CHANGETHEEQUATION.ORG, http://changetheequation.org/stemtistic-short-supply-0 (last visited June18, 2013) (discussing role model identification among minority students). "In 2007, Black and Latino students comprised thirty-eight percent of K-12 enrollments. Black and Latino teachers comprised only fourteen percent of the teacher force." *Id.*

65. *See id.* (observing that the number of minority teachers available to serve as role models is staggeringly low); *see also* Richard M. Ingersoll & Henry May, *The Minority Teacher Shortage: Fact or Fable?*, EDUCATION WEEK (Sept. 1, 2007), http://www.edweek.org/ew/articles/2011/09/01/kappan_ingersoll.html (citing lack of minority teachers as a contributing factor to disparities found in minority college enrollment, job opportunities, and quality of life).

66. U.S. DEPARTMENT OF EDUCATION OFFICE OF CIVIL RIGHTS, 2009–2010 CIVIL RIGHTS DATA COLLECTION, Mar. 12, 2012, *available at* http://www2.ed.gov/about/offices/list/ocr/docs/crdc-2012-data-summary.pdf.

67. *See generally* Dr. Irving P. McPhail, *The 'New' American Dilemma: STEM and Minorities*, USNEWS (Oct. 11, 2011), http://www.usnews.com/news/articles/2011/10/11/the-new-american-dilemma-stem-and-minorities (coining the lack of minorities in STEM as "The 'New' American Dilemma").

68. *See* Nicole Buzzetto-More et al., *Unlocking the Barriers to Women and Minorities in Computer Science and Information Systems Studies: Results from a Multi-Methodolical*

concerns, in 2003, the Minority Serving Institution Digital and Wireless Technology Opportunity Act was introduced to Congress upon recognition that minority-serving institutions were drastically lagging behind in digital and technology resources due to a lack of finances as compared to other institutions.[69]

In the 2003 hearing, Senator George Allen from Virginia stressed the need for increased funding and proposed that $250 million dollars in grants over a five-year period through the National Science Foundation would help close the "digital divide" experienced by minority-serving institutions.[70] The Bill was passed by the Senate, but was never passed by the House, and was subsequently re-introduced in 2005 only to meet the same demise.[71] For minority students attending lower-income schools and minority-serving universities, the under- or non-exposure to technology or science-based curricula and labs due to lack of sufficient funding will have lasting effects on their professional careers and ultimately on the future of our nation.

Another significant factor in the current status of Hispanic women in STEM is a lack of parental education and awareness regarding their child's capacity in STEM fields, which results from the often unique familial situation of Hispanic women.[72] The added cultural issues may affect their enrollment and retention in college and professional careers in

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Study Conducted at Two Minority Serving Institutions, 9 J. INFO. TECH. EDU. 115, 129 (2010) (surveying female minority students and determining that "female students attending a minority-serving institution have received less exposure to, and counseling about, computing than males"); *see also* MALCOM ET AL., *supra* note 24, at 16 (describing the consensus opinion of the female minority scientists interviewed to reveal that women's colleges and minority-serving universities were commonly less-equipped with science resources, ultimately under-preparing them for graduate studies in STEM.

69. *See generally Infrastructure Needs of Minority Serving Institutions: Hearing Before the Committee on Commerce, Science, and Transportation*, 108th Cong. 2–3 (2003) (presenting statement of Sen. Allen on the importance of the Bill and the impact that it was projected to have on minority serving institutions and the futures of our nations' minority students). Senator Allen noted in the hearing that Minority Serving Institutions are often faced with a gap in funding and resources for students as compared to other institutions. *Id.*; *see also* S. 196, 108th Cong. (2003) (outlining the details of the Minority Serving Institution Digital and Wireless Technology Opportunity Act of 2003).

70. *Infrastructure Needs of Minority Serving Institutions: Hearing Before the Committee on Commerce, Science, and Transportation*, 108th Cong. 2–3 (2003); S. 196, 108th Cong. (2003).

71. S. 196, 108th Cong. (2003); H.R. 2801, 108th Cong. (2003); S. 432, 109th Cong. (2005); H.R. 921, 109th Cong. (2005).

72. *See* MALCOM ET AL., *supra* note 24, at 34 (discussing traditional gender roles and expectations placed upon Mexican American women); *see also* Sy & Romero, *supra* note 43, at 214–15 (describing "familismo" as a traditional Hispanic family value in which family needs are placed above personal needs). Studies cited conclude that Hispanic women most commonly fulfill such family obligations. *Id.*

STEM.[73] It is important to note that this lack of familial awareness of their daughter's potential success in STEM fields may occur because there are no STEM role models within students' families[74] or because of the families' reluctance to encourage their daughter to enter such fields.[75] In fact, recent reports have concluded that minority students are likely to choose not to study STEM subjects or refrain from choosing STEM as a career because of a lack of familial support or encouragement to enter into such fields.[76]

Finally, another factor that contributes to the underrepresentation of Hispanic women in STEM is one that seriously affects the retention of women in graduate studies and professional employment.[77] The conditions of STEM graduate studies have had a long-standing reputation of long, harsh hours of work and are most often thought of as unsuitable for women in general.[78] Minority women scientists interviewed in the

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73. *See* Susan R. Sy & Jessica Romero, *supra* note 43 (crediting "the importance of developing self-sufficiency to support the family, the voluntary nature of their financial contributions, and their role as a surrogate parent for younger family members" as being of great hierarchical importance, and thus categorizing these as factors that hinder Hispanic women from matriculating into a higher education institution).

74. *See* Sheehy, *supra* note 55 (quoting Carlos Rodriguez, a research scientist at the American Institutes for Research, as stating that a "[l]ack of role models within their own families is another major obstacle minority students face in graduating from high school and advancing to higher education").

75. *See* GLORIA CRISP & AMAURY NORA, OVERVIEW OF HISPANICS IN SCIENCE, MATHEMATICS, ENGINEERING, AND TECHNOLOGY (STEM): K-16 REPRESENTATION, PREPARATION, AND PARTICIPATION (2012), *available at* http://www.hacu.net/images/hacu/OPAI/H3ERC/2012_papers/Crisp%20nora%20-%20hispanics%20in%20stem%20-%20updated%202012.pdf (noting how influential family members are in nurturing an interest in STEM fields among young Hispanic women).

76. *See* Buzzetto-More et al., *supra* note 68, at 116 (discussing reports that link lower minority and female minority participation in STEM to poor family support and lack of role models in STEM field); *see also* MALCOM ET AL., *supra* note 24, at 10 (noting a deficit of minority women scientists as role models in media and minority communities contributed to a communicative disconnect); *see also* Eleanor Chute, *Lack of Diversity Part of Equation in STEM Fields: Colleges Try to Increase Numbers of Women, Minorities in Science and Engineering*, Pittsburgh Post-Gazette (Feb. 10, 2009), *available at* http://www.post-gazette.com/stories/news/education/lack-of-diversity-part-of-equation-in-stem-fields-329392/#ixzz2Gmzsw97z (revealing the personal experience of Dana Bruck, a bioengineering senior who never heard of engineering). Bruck explained, "No one in my family went to college, ever . . . I started looking it up and trying to find more about it." *Id.*

77. *See* Jennifer Glass et al., *Retention of Women in the STEM Labor Force: Gender Similarities and Differences with a Focus on Destination Status* 12 (Sept. 19, 2011), *available at* http://paa2012.princeton.edu/papers/121492 (comparing the staggering number of women that leave STEM jobs for non-STEM jobs with the number of men who do the same).

78. *See id.* ("Structural characteristics of careers in science and engineering, such as long hours of work and frequent travel, run on a collision course with childbearing and parenthood, and may encourage women to choose less demanding jobs outside their pri-

Double Bind Report affirmed that "[t]he costs to the individuals who aspire to these fields are extremely high in terms of the economic resources, human energy and personal commitment and endurance . . . Any scientist can probably remember instances where he or she had to decide between a few extra hours in the lab or a few more hours of sleep . . . ."[79]

Aside from the arduous experiments, perplexing theories, and extended work hours, female minority students may face additional prejudices that add to the already stress-ridden experience of graduate school.[80] This consideration is illustrated in the pyramid depiction of STEM achievement among minority and non-minority males and females, climbing from high school interest in STEM at the base to achieving STEM advanced degrees at the apex of the pyramid in FIG.1.

As the interest of minority women continues steadily up the pyramid with the same percentage, a drastic decline is observed as higher-level degrees are obtained. From the levels of graduate study, postdoctoral appointments, and faculty or research positions, minority women have been hypothesized to experience a myriad of discrimination and prejudice to account for their underrepresentation in STEM fields.

The most cited explanations for this result include: sexual discrimination,[81] racial discrimination,[82] the challenges of family-work balance,[83]

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mary field of study. The cultural consensus on which sex should do which jobs means the gendered division of market work does not only depend on the preferences of individuals.").

79. MALCOM ET AL., *supra* note 24, at 2.

80. *See id.* (relating additional burdens and factors facing minority women in science). Malcom further emphasized the added stresses of minority women who attended women- or minority-serving colleges for undergraduate education by stating that "[a]cademic difficulties at the graduate level were more likely due to inadequacies of undergraduate courses and/or equipment. *Id.* at 16. This was especially typical of the experience of women who had attended minority or women's colleges." *Id.*

81. *See generally* Lucy M. Stark, *Exposing Hostile Environments for Female Graduate Students in Academic Science Laboratories: The McDonnell Douglas Burden-Shifting Framework as a Paradigm for Analyzing the "Women in Science" Problem*, 31 HARV. J.L. & GENDER 101, 103–04 (2008) (discussing a variety of sources for gender discrimination against women in the academic science setting).

82. *See* MALCOM ET AL., *supra* note 24, at 2. Malcolm elaborated:

> Because of the history of racial discrimination in the United States, a history which does not exclude the scientific community, the price of a career in science is very high for members of minority groups. The attitudinal, financial, and cultural barriers to full participation in science by black, Mexican American, Native American and Puerto Rican citizens have not been removed, and this is reflected by the small number of members of these racial and ethnic groups in the scientific workforce.

Id.

83. *See id.* (describing perceived incompatibility between familial demands on women and careers in traditionally male-dominated professions); *see also* Ceci & Williams, *supra*

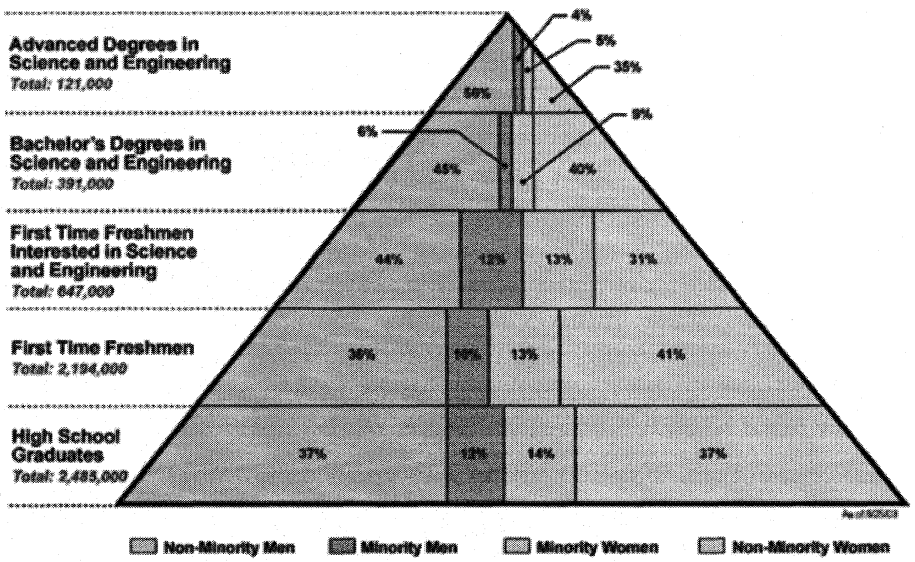

Figure 1. A pyramid illustration incorporating the levels of achievement in STEM, where "Minority" nrepresents HIspanic, African American, and Native American. Source: Joan Burrelli, NSF, based on 1999 common core of Data, U.S. Department of Education, Naitonal Center for Education Statistics (NCES).

and competition in fields dominated by majority males.[84] The large gender gap observed among tenured STEM faculty members is so pervasive that it is often cited as a contributing factor when building a prima facie case for sexual discrimination.[85] A prime example of this ever-present gender gap is demonstrated by the fact that Yale University did not hire its first female tenured physics professor until 2001.[86]

The lack of women in tenured STEM faculty positions has been attributed to the overall culture, conditions, and politics of STEM academia as a whole. Ellen Daniell, author, researcher, and former professor, described her personal experiences in academia as ". . . a sense of powerlessness, overwhelming workloads, and competition for access to grant money, lab space, and students."[87] Similarly, Professor Janet Oster-

note 48, at 3161 (concluding that work-family balance and child-rearing and fertility choices are major factors contributing to the scarcity of women in STEM).

84. *See* MALCOM ET AL., *supra* note 24, at 2 (discussing how male dominance in scientific fields makes entry and participation in scientific careers more difficult for women).

85. *See generally* Stark, *supra* note 81, at 106–12 (summarizing viewpoints of experts, case rulings, and legislation regarding cases of discrimination under Title VII).

86. Meg Urry, *Why Bias Holds Women Back*, CNN (Oct. 1, 2012, 5:25 P.M.), http://www.cnn.com/2012/10/01/opinion/urry-women-science/index.html?hpt=hp_c1.

87. DANIELL, *supra* note 54, at 162.

young stated that "[w]omen who are eligible for faculty positions have earned a Ph.D. in a chemistry department . . . have absorbed the tone of that environment . . . and have decided they don't want any more of it."[88]

Along these lines, a scientific study conducted at Yale University recently confirmed that both male and female research professors equally hold a preference for males over females when selecting laboratory personnel, even when candidates had identical qualifications.[89] This was the first experiment conducted on high-level research faculty, and although this problem has been scrutinized under a multitude of lenses, this new finding may give insight into how to begin solving the problem of underrepresentation.[90]

B. *Current Legal Solutions to Target the Problem and Potential Areas of Improvement*

In order to measure the progress that our lawmakers and courts have made to elevate the status of Hispanic women in the sciences, it is important to survey current legal methods and note what improvements can be made to fine-tune their efforts toward supporting this specific subset of women. In the examination of these legal measures, it is important to distinguish between *studies* and *actual undertakings*. It is also worth noting that programs designed to exclusively aid women, as well as those solely directed towards minorities, may be beneficial to the more specific Hispanic female population. However, methodologies precisely aimed at assisting those who fall into the overlap of the two disadvantaged populations—namely, Hispanic women—are of particular interest because they are still more underrepresented than simply women and general minority groups alone.

Again, it is imperative to formulate methodologies that will build upon what is currently being done and ultimately target the roots of the problem—as Isaac Newton stated, we must "stand[ ] on the shoulders of gi-

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88. Elizabeth Zubritsky, *Women in Analytical Chemistry Speak Out*, ANALYTICAL CHEMISTRY 278A (2000).

89. *See* Corinne A. Moss-Racusin et al., *Science Faculty's Subtle Gender Biases Favor Male Students*, 109 PROC. NAT'L ACAD. SCI. 16474–78 (2012), *available at* www.pnas.org/cgi/doi/10.1073/pnas.1211286109 (surveying 127 chemistry, physics, and biology professors across the nation's universities in a randomized double blind test). Professors were asked to record their responses to resumes for lab management positions. *Id.* The resumes consisted of identical qualifications with gender as the only variable. *Id.* Professors of both sexes consistently rated the male applicants above the female applicants on competency, hiring qualifications, and desire to mentor the applicant. *Id.*

90. *See generally id.* at 16477 (finding "both male and female faculty judged a female student to be less competent and less worthy of being hired than an identical male student, and also offered her a smaller starting salary and less career mentoring"); *see also* Urry, *supra* note 86 (discussing the author's own experiences with bias in the sciences).

ants."[91] In order to simplify our analysis, the acts, policies, and programs currently in place typically fall into one or more of three general categories: funding, opportunity, and awareness. The concept of "funding" denotes direct financial assistance to the group of interest. The notion of "opportunity" entails the notion of providing enhanced opportunities for the group of interest (along the lines of affirmative action, for example) in the various stages of education and employment. Finally, the idea of "awareness" entails providing or increasing STEM education to parents, students, employers, and employees.

The timing of introducing solutions from these three categories is also an important consideration. The early education and pre-collegiate, collegiate, graduate studies, and professional career levels are stages at which each of the various solutions will have different impacts. Aid to Hispanic women may be more or less influential depending upon the stage in her life at which she receives the assistance. The ultimate goal must be to develop the strategies that will effectively target the problem at the most formative stages of a Hispanic woman's life.

i. Early Education and Pre-collegiate Period

There is currently a great need for young Hispanic women to be introduced to STEM early in their education and to be taught by qualified STEM teachers.[92] Appropriately, the Department of Education and NSF may be supervising an additional STEM program in the near future that may answer that very need.[93]

The STEM Masters Teacher Corps program was recently proposed to Congress by President Obama under his 2013 budget and is aimed at improving STEM education for all students at the pre-collegiate level.[94] This program will offer a dual problem-solving mechanism if implemented. It incentivizes STEM employment by providing additional eco-

91. Newton, *supra* note 8.

92. *See* Darling-Hammond & Post, *supra* note 59 (explaining recent investigations that uncovered that ". . . the difference in teacher quality may represent the single most important school resource differential between minority and white children . . ."); *see also* Almy & Theokas, *supra* note 63 (noting "one in every four secondary math classes in high-poverty schools is taught by a teacher with neither a math major nor certification in math").

93. *See* White House Press Release, *President Obama Announces Plans for a New, National Corps to Recognize and Reward Leading Educators in Science, Technology, Engineering, and Math*, WHITE HOUSE (July 17, 2012), http://www.whitehouse.gov/the-press-office/2012/07/17/president-obama-announces-plans-new-national-corps-recognize-and-reward- (announcing plans for a new STEM teacher recognition and retention program).

94. *Id. See also* S.B. 758, 112th Cong. (2011) (proposing similar legislation for consideration to the Senate in 2011); *see also* H.R. 2598, 112th Cong. (2011) (introducing identical legislation to the Senate counterpart for consideration in the House in 2011).

nomic incentives to STEM professionals in teaching positions, and, in turn, the program fosters a more solid STEM education for the young people who will be taught by the growing corps of STEM teachers.[95] Although this program will be directed to help low-income and minority-concentrated schools in general, it will still benefit young Hispanic women.

Similarly, a Bill was introduced to Congress in April 2012 titled the "Project Ready STEM Act," which would allow the Secretary of the Department of Education to award STEM grants to elementary and middle schools by amending the Elementary and Secondary Education Act of 1965.[96] If enacted, this Bill will provide funding for STEM-centered education in elementary and middle schools, and for summer, after-school, and weekend programs.[97] If the Bill is enacted, many disadvantaged minority youths could finally have a strong STEM foundation and an opportunity to pursue STEM in higher education and beyond.[98] Although this Act is aimed at benefitting all minority children through increased funding, and thus increased opportunities, Hispanic female youth will also benefit.[99] Bills like these are a step in the right direction, and future fine-tuning of such efforts towards the most gravely underrepresented minority groups would positively change the lives of many Hispanic females.

In 2009, President Obama also initiated a partnership among private and public businesses and organizations to contribute to STEM education, "Educate to Innovate."[100] As part of this CEO-headed collabora-

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95. White House Press Release, *supra* note 93.

96. H.R. 4366, 112th Cong. (2012).

97. *See* H.R. 4366 (recognizing minorities as underrepresented in STEM fields).

98. *See* H.R. 4366 (noting that after school programs have been a method for "addressing the achievement gap in underserved communities," and that ethnic minority youth are more likely than non-minority youth to participate in such after school programs). In fact, the proposed Act notes that twenty-one percent of Hispanic students are currently enrolled in some sort of after school program. *Id.* Thus, developing after school curriculums for middle and secondary school students involving STEM fields may better prepare such students for participation in STEM fields in college and beyond.

99. *See* AFTER SCHOOL ALLIANCE, STEM LEARNING AFTER SCHOOL: AN ANALYSIS OF IMPACT AND OUTCOMES 1 (2011), http://www.afterschoolalliance.org/STEM-AFter-school-Outcomes.pdf (stating that girls participate in after school programs in equal numbers to boys).

100. *See* Whitehouse Press Release, *President Obama Announces Plans for a New, National Corps to Recognize and Reward Leading Educators in Science, Technology, Engineering, and Math,* WHITE HOUSE (July 17, 2012), http://www.whitehouse.gov/the-press-office/2012/07/17/president-obama-announces-plans-new-national-corps-recognize-and-reward- (highlighting the Obama administration's efforts to improve and expand opportunities in the STEM fields); *see also Educate to Innovate*, WHITE HOUSE, http://www.whitehouse.gov/issues/education/k-12/educate-innovate (last visited June 28, 2013) (noting that the Obama administration launched Educate to Innovate to help American students

tion, an additional program called "Change the Equation" was commenced to allow the partnering businesses to help fund STEM education for schools nationwide, especially in low-income schools.[101]

In these few examples of presently implemented and proposed programs directed at high-needs, minority-concentrated schools, it is evident that the Obama administration continues to make minority underrepresentation in STEM a priority. Again, the programs are not specifically geared towards young Hispanic women, but they provide an important stepping-stone from which sub-programs may someday follow.

Although there are virtually no programs that direct their efforts specifically towards Hispanic female youth,[102] there are a few programs in place that come quite close. In the early 1970s, a group of women scientists and educators in California became concerned with the extremely low number of women enrolled in math courses.[103] They began to organize what has now flourished into a nationwide program of workshops called the "Expanding Your Horizons" Network (EYH).[104]

In 2010, EYH won the National Science Board's Public Service Award.[105] This organization organizes hands-on STEM workshops for

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increase participation and achievement in math and science-related fields over the next ten years). The Educate to Innovate initiatives aim to more effectively prepare STEM teachers through public-private partnerships. *Id.*

101. *See Participating Companies: Joining Forces to Reach More Children, Change the Equation: Igniting Learning*, http://http://www.ignitinglearning.org/node/239 (last visited June 28, 2013) (reporting that since Change the Equation's launch in September 2010, twenty-four companies have expanded STEM learning programs to over 130 new sites across the country). These efforts will result in expanded learning opportunities for almost 40,000 youth. *Id.* Over half of these students are currently attending low income schools. *Id.; see also* Whitehouse Press Release, *supra* note 100 (noting Change the Equation's goal of improving the quality of STEM education in schools across the country and noting the involvement of CEOs from private sector businesses in Change the Equation initiatives).

102. *See, e.g.*, GIRL SCOUTS OF THE UNITED STATES OF AMERICA, *supra* note 5, at 21 (2012), http://www.girlscouts.org/research/pdf/generation_stem_full_report.pdf (reporting that Hispanic girls surveyed are interested in pursuing STEM opportunities, but often lack specific support programs or adults who work in STEM to encourage them to pursue such opportunities).

103. *See* EXPANDING YOUR HORIZONS NETWORK, *supra* note 29. http://www.expandingyourhorizons.org/about/organization/intro/ (last visited June 28, 2013) (explaining the origins of the Expanding Your Horizons Network and noting that the organization started in 1974 as an "informal group" of women scientists and teachers living and working in the San Francisco area who had grown concerned with the low numbers of girls participating in math courses).

104. *See id.* (listing youth girl's conferences across the United States). Currently, EYH conferences are hosted in thirty-four states. *Id.*

105. *Expanding Your Horizons Network Receives 2010 National Science Board Award,* NATIONAL SCIENCE BOARD, http://www.nsf.gov/nsb/news/news_summ.jsp?cntn_id=116684 (last visited June 29, 2013).

middle school and high school girls in thirty-four states, as well as in Europe and Asia.[106] The individual workshops are hosted by female scientist volunteers, and provide an opportunity for girls to meet and learn from female scientists in their own communities.[107] The network is funded by membership dues, donations, and grants from businesses and government agencies.[108] The 2011 EYH conferences hosted 20,736 participants nationwide with average minority participation of forty-eight percent, and at least one conference yielded as high as eighty-one percent minority participation.[109]

Similarly, the NSF has recently funded the University of Arizona Southwest Institute for Research on Women (SIROW) in an effort to create a partnership between the university's Colleges of Engineering and Education, the Women in Science and Engineering (WISE) program, and other partner organizations to mentor sixty Hispanic and American Indian students in hands-on STEM projects and activities.[110] With the $1.2 million grant, the selected Hispanic and American Indian students will range from third grade to eighth grade and will be involved in STEM-intensive workshops, experiments, and field trips for a period of three years.[111] This program, like EYH, will expose youth to women working in STEM fields in their communities and will provide a unique and impactful STEM experience for students who would likely never be exposed

106. *See* EXPANDING YOUR HORIZONS NETWORK, *supra* note 29 (demonstrating the reach of EYH with opportunities for young girls in Geneva, Switzerland; Naples, Italy; Thailand; and Yokosuka, Japan).

107. *See* EXPANDING YOUR HORIZONS NETWORK 2011 ANNUAL REPORT 3 (on file with *The Scholar: St. Mary's Law Review on Race and Social Justice*) (describing conferences and workshops hosted by women currently working in STEM fields). These volunteer efforts help immerse over 20,000 girls across the country in STEM subjects annually. *Id.*

108. *See* EXPANDING YOUR HORIZONS NETWORK, *supra* note 29 (noting financial support for the EYH Network comes from membership dues and from grants and financial donations from the private and non-profit sectors, as well as government agencies).

109. *See* 2011 ANNUAL REPORT, *supra* note 107 (highlighting that across the United States, average minority participation at 2011 EYH Network conferences was forty-eight percent).

110. *See* La Monica Everett-Haynes, *Grant Funds STEM Program for American Indian, Hispanic Youth*, UNIVERSITY OF ARIZONA NEWS (May 4, 2012), http://uanews.org/story/grant-funds-stem-program-american-indian-hispanic-youth (confirming the NSF's recent investment in the Southwest Institute for Research on Women at the University of Arizona will allow the University's engineering departments to launch mentorship programs aimed at immersing Hispanic and American Indian students in STEM subjects).

111. *See id.* (explaining that the program will be geared toward students in late elementary school through middle school). The program will feature students being paired with a trained mentor who will lead them through various STEM-related activities for three years. *Id.* The goal of the program is to instill both a lasting interest in STEM fields that will ultimately increase minority participation in the STEM workforce. *Id.*

to STEM without such a program. Rosi Andrade, the co-principal investigator of the NSF grant, stressed that "for the [NSF] project to effectively serve as a strategy model for other schools and school districts . . . it is imperative that the process of developing successful partnerships be documented and strategies to achieve successful partnerships be made available."[112]

As the EYH Network has continued to report annually on its expanding and strengthening partnerships and participation, there is hope that the NSF's SIROW program may likewise succeed and grow. It is vital that we continue to highlight the impact of these programs and advocate for more programs like these, which specifically introduce STEM-centered curricula to young Hispanic women. If a Hispanic woman's interest in STEM is ignited at an early age, she may ultimately go on to be a STEM role model in academia and in her own family and community. Taking into consideration the pyramid illustration in FIG. 1 it is plausible that such programs will allow more Hispanic women to rise closer to the apex of STEM achievement.

ii. Collegiate or University Level

Studies have shown that minority-serving and women's universities have a reputation of being less equipped to prepare their students for graduate studies and professional careers in STEM than other universities.[113] In 2007, the Department of Education's Minority Science and Engineering Improvement Program (MSEIP) was implemented to aid minority-serving institutions in promoting long-term improvement in STEM academic enrollment and career preparation for ethnic minorities, with a special emphasis on encouraging the participation of minority women.[114]

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112. *Id.*

113. *See, e.g.*, Buzzetto-More et al., *supra* note 68, at 118 (surveying female minority students). Findings indicate that "female students attending a minority-serving institution have received less exposure to, and counseling about, computing than males." *Id.*; *see also* MALCOM ET AL., *supra* note 24, at 16 (describing consensus interview opinion among female minority scientists that women's colleges and minority-serving universities were commonly less-equipped with science resources). Scientists interviewed noted that this ultimately under-prepared them for graduate studies in STEM. *Id.*

114. *See* U.S. Dep't of Educ., *Minority Science and Engineering Improvement Program*, http://www2.ed.gov/programs/iduesmsi/index.html (last visited June 13, 2013) (stating that the program's primary goal is assisting "predominantly minority institutions in effecting long-range improvement in science and engineering education programs and increasing the flow of underrepresented ethnic minorities, particularly minority women, into science and engineering careers"); *see also* 20 U.S.C. § 1067e (2011) (authorizing enactment of the Minority Science and Engineering Improvement Program). The statute outlines that, subject to appropriations availability, the Secretary of the Department of

Since its inception, MSIEP has granted financial assistance to a variety of minority-serving schools across the nation.[115] The program is designed to fund predominantly minority-serving universities[116] that propose one of four different types of projects aimed at fostering higher education and career development.[117] The approach of this program is one that targets university-enrolled minority students by funding their institutions and providing them with STEM resources that would otherwise not be available to them.[118]

Additionally, the Department of Education has also established the Higher Education Opportunity Act (HEOA), which in turn initiated three new programs in 2008 directed at promoting higher education opportunities for Hispanics and African American students.[119] The three newly established programs consisted of the following: "(1) promoting postbaccalaureate [sic] opportunities for Hispanic Americans; (2) Master's degree programs at historically Black colleges and universities; and (3) Master's degree programs at predominantly Black institu-

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Education is to make grants that will fund initiatives to engage low income and minority students in STEM fields with the goal of encouraging these students to pursue careers in these fields post-education. *See id.*; *see also* 34 C.F.R. § 637.12 (2011) (directing application of the grant program toward implementation of programs that will improve STEM career preparation for minority students, especially women).

115. *See* U.S. Dep't of Educ., *Education Department Awards Nearly $2.9 Million to Colleges and Universities to Strengthen Minority Participation in STEM-Related Fields*, http://www.ed.gov/news/press-releases/education-department-awards-nearly-29-million-colleges-and-universities-strength (last visited Oct. 21, 2012) (noting the U.S. Department of Education would be awarding millions of dollars in grants to schools that serve "large minority populations" as part of larger efforts to increase interest in and improve preparation for STEM-related careers among minority women); *see also* U.S. Dep't of Educ., *$3.1 Million in Grants Awarded to Improve Science, Engineering Education at Predominantly Minority Institutions*, http://www.ed.gov/news/press-releases/31-million-grants-awarded-improve-science-engineering-education-predominantly-mi (last visited Oct. 21, 2012) (announcing that the U.S. Department of Education would award fourteen grants to be used for improving STEM programs at "predominantly minority institutions" with the ultimate goal of increasing the participation of women from underrepresented communities in STEM career fields).

116. *See* 34 C.F.R. § 637.4 (2012) (defining a "minority institution" as "an accredited college or university whose enrollment of a single minority group or combination of groups . . . exceeds fifty percent of the total enrollment").

117. *See* U.S. Dep't of Educ., *supra* note 114 (listing four types of projects supported by the program funds: design projects, institutional projects, cooperative projects, and special projects).

118. *See, e.g.*, U.S. Dep't of Educ., *supra* note 115 (noting the U.S. Department of Education would be awarding millions of dollars in grants to schools that serve "large minority populations" as part of larger efforts to increase interest in and improve preparation for STEM-related careers among minority women).

119. Higher Education Opportunity Act, Pub. L. No. 110-315, § 315, 122 Stat. 3078 (2008).

tions."[120] Much like MSEIP, the approach of HEOA is one that targets minority university-enrolled students by creating opportunities in higher education for which they may not otherwise qualify.[121] Because these programs focus on providing opportunities to students attending disadvantaged minority institutions, Hispanic women may also benefit. If these programs prove to be successful, they may pave the path for subprograms that will directly target Hispanic women.

In another example, NASA has recognized the underrepresentation of both minorities and women in the STEM fields in general and has also recognized the large role their agency can play in closing the large gender and racial gaps in the sciences.[122] To that end, NASA has founded various programs that financially support minorities,[123] including female minorities,[124] at the university level.

As successful and thriving as these NASA programs are, it is important to keep in mind that they are aimed at students at the university level who are already on the path to graduate school.[125] It is also important to note that although such financial support and research experience will no doubt change the lives of the qualifying students, the pool of eligible students who can apply to these programs is quite shallow. Thus, as we voice our support for these programs, we must also consider offering stronger support for the youth programs that will help students to progressively attain higher levels of STEM achievement.

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120. *Id.*

121. *Id.*

122. *See* NASA, *Social, Cultural, and Educational Legacies*, http://www.nasa.gov/centers/johnson/pdf/584743main_Wings-ch6a-pgs459-469.pdf, at 461–465 (last visited June 16, 2013) (recounting achievements by NASA and how NASA has impacted the culture of the United States); *see also* Heather R. Smith, *A Wise Choice*, NASA (Sept. 9, 2009), http://www.nasa.gov/audience/foreducators/postsecondary/ features/a-wise-choice.html (describing NASA's contributions to encouraging minority women to participate in NASA-related and STEM fields).

123. *See generally* NASA, *Minority University Research and Education Programs*, http://www.nasa.gov/offices/education/centers/marshall/minority/index.html (listing numerous scholarships, fellowships, and internships that NASA offers to minority students).

124. *See* Dan Stillman, *World of Opportunity*, NASA (Jan. 20, 2005), http://www.nasa.gov/audience/foreducators/k-4/features/F_World_of_Opportunity_prt.htm (highlighting minority women that have been supported by NASA's MS PHD'S® professional development program).

125. *See generally* NASA, *Jenkins Pre-doctoral Fellowship Project*, http://www.nasa.gov/audience/forstudents/postsecondary/features/F_Harriett_Jenkins_Fellowship_Program.html (last visited June 16, 2013) (promoting a pre-doctoral fellowship program aimed at broadening programs available to underrepresented minorities and women).

iii. Graduate Studies and Professional Careers

STEM graduate-level and work-level environments have a reputation for being particularly unsuitable for women, especially minority women.[126] In response to well-known claims of sexual discrimination, racial discrimination, and challenging family-work balance, many universities have taken steps to recruit increased numbers of female graduate students.[127]

For example, with respect to the issue of family-work balance for graduate students, some universities have implemented paid maternity leave for their graduate students.[128] Yet, what is being done or can be done to specifically increase *Hispanic* female participation in STEM graduate studies and employment? After publication of the recent Yale Report, there should be a push to counter the unconscious bias acted upon by professors in research institutions. As the authors of the report propose, "these results suggest that interventions addressing faculty gender bias might advance the goal of increasing the participation of women in science."[129]

Programs such as "ADVANCE: Increasing the Participation and Advancement of Women in Academic Science and Engineering Careers" speak directly to this cause.[130] The ADVANCE program funds universi-

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126. *See* MALCOM ET AL., *supra* note 24, at 2 (noting exacerbating difficulties such as physical disability, prejudice, and poverty).

127. *See, e.g.*, Don M. Gruenbacher, et al., *Increasing Graduate Students in STEM Fields Through a Focused Recruitment Workshop, in* GLOBAL ENGINEERING: KNOWLEDGE WITHOUT BORDERS, OPPORTUNITIES WITHOUT PASSPORTS S2-H9, S2-H13 (2007), *available at* http://ieeexplore.ieee.org/xpl/articleDetails.jsp?partnum=4418076&searchProductType=IEEE%20Conferences (featuring a case study from the Kansas State University Department of Electrical and Computer Engineering.) As part of overall efforts to increase enrollment of women pursuing advanced degrees in the department, KSU used a portion of grant money from the NSF's ADVANCE program to host a workshop called "Finding the Ideal Graduate Program." *Id.* The workshop covered topics such as "finding the right school," "balancing life and work," and "how to succeed in graduate school." *Id.* Eighty-six percent of participants reported feeling better prepared for graduate studies. *Id.*

128. CALIFORNIA INSTITUTE OF TECHNOLOGY HUMAN RESOURCES OFFICE, CALTECH GRADUATE STUDENT MATERNITY LEAVE AND BONDING LEAVE POLICIES, *available at* http://cit.hr.caltech.edu/parenting/grad_maternity_leave.pdf (last visited June 22, 2013); MIT SCHOOL OF SCIENCE, MATERNITY LEAVE POLICY FOR GRADUATE STUDENTS, http://web.mit.edu/science/academicprograms/GSO%20Maternity%20Leave%20Policy.pdf (last visited June 22, 2013); UCLA CHILDBIRTH ACCOMMODATION FUNDING, http://www.grad.ucla.edu/gss/childbirth/ (last visited June 16, 2013).

129. Moss-Racusin et al., *supra* note 89, at 16474.

130. *See ADVANCE: Increasing the Participation and Advancement of Women in Academic Science and Engineering Careers (ADVANCE)*, NATIONAL SCIENCE FOUNDATION, http://www.nsf.gov/funding/pgm_summ.jsp?pims_id=5383 (last visited June 17, 2013) (stating the goal of ADVANCE "is to develop systemic approaches to increase the representa-

ties and other organizations that employ professional STEM graduates and that participate in actively pinpointing and alleviating any issues associated with lower female recruitment, retention, as well as with promotion.[131] The NSF underscores that "ADVANCE does not support activities to increase or retain the number of women entering into or persisting in STEM doctoral degree programs; rather the program focuses on ensuring that women faculty consider academia as a viable and attractive career option."[132]

Thus, this program is specifically in place to help discover any gender (or racial) biases that may be plaguing women scientists currently employed, then fix those problems, and to ultimately provide better academic working conditions for future female faculty. Furthermore, the program highlights areas of need for "special populations of women," which they define as "women of diverse characteristics and backgrounds including, but not limited to: race, ethnicity, disability status and sexual orientation."[133] Therefore, it is an ideal mechanism for curing the underrepresentation of Hispanic women in academic faculty positions by actively working to make institutions aware of their own flawed working environments and providing opportunities for Hispanic women scientists that would otherwise not be as desirable.

Additionally, in the research industry, many research and development companies are creating committees and boards dedicated to seeking and retaining employees of diverse backgrounds and ethnicities and reporting the diversity and retention of such employees to the public.[134] Many of these companies begin recruiting graduates during summer programs and other conferences especially designed for graduate students of diverse ethnicities.[135] In publicizing these efforts and events, these companies

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tion and advancement of women in academic STEM careers, thereby contributing to the development of a more diverse science and engineering workforce").

131. *Id.*

132. *Id.*

133. *Id.*

134. *See, e.g.*, PROCTOR & GAMBLE, DIVERSITY & INCLUSION P&G 2011/2012 ANNUAL REPORT 6, http://www.pg.com/en_US/downloads/company/purpose_people/PG_ DiversityInclusion_AR_2012.pdf (underscoring Proctor & Gamble's commitment to diversity and inclusion initiatives at their company and highlighting the benefits of building a corporate culture that supports diversity); *Valuing Our Differences*, DOW CHEMICAL, http://www.dow.com/careers/diversity/ (last visited June 17, 2013) (noting the company views diversity as an important asset to building a productive and competitive corporate culture); *Diversity Goals*, DOW CHEMICAL, http://www.dow.com/careers/diversity/beliefs/goals.htm (last visited June 17, 2013) (highlighting DOW's goals for corporate diversity).

135. *See, e.g.*, *Diversity Goals*, *supra* note 134, at 10 (describing the intent of DOW's BEST program). The program intends to host conferences to afford underrepresented minorities in science and engineering fields the opportunity to learn more about the company and skills the company is looking for in candidates for employment.

demonstrate that they are working towards providing suitable and supportive environments for minorities, especially for minority women. In showing a commitment to these issues and opportunities for minorities, these companies may recruit greater numbers of Hispanic women into their high-ranking research and development positions.

iv. Steps in the Right Direction and How to Continue in that Path

It is important to note that there have been remarkable and noteworthy advancements in STEM fields since the publication of the Double Bind Report in 1976. In general, more data is being obtained to track the number of minorities in schools, universities, and professional careers in STEM.[136] This is important because in order to fix the problem, we must track the numbers of minorities actively participating in STEM, or at least expressing an interest in STEM, discover empirical trends and improvements, and monitor the severity of the underrepresentation. Consistent and accurate tracking by public and private agencies, schools, and universities not only helps pinpoint problems, but tells whether implemented programs are working.

As indicated by the small sampling of STEM enrichment programs that have been discussed at the various stages of education (early education, pre-collegiate, collegiate, and graduate studies) and professional employment, it is important to realize that the cure for the underrepresentation of Hispanic women cannot be found at only one of these stages. While explaining a program called "BEST" and how it relates to the pyramid in FIG.1, authors Rochin and Mello recommend that:

> [T]hese students would succeed in [STEM] by supporting them over structural and institutional barriers. What is needed, accordingly, is planning with students and attention to institutional challenges at various levels of the educational pyramid. In other words, ways to widen the participation of [underrepresented minorities] at all levels of the pyramid . . . are needed.[137]

It is imperative that policies support Hispanic women at each level of STEM achievement, from early education to professional careers, with a special emphasis on policies that expose more youth to STEM. This will ultimately allow more Hispanic women to reach the summit of the aforementioned STEM pyramid in FIG. 1.

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136. *See generally* NATIONAL SCIENCE FOUNDATION, *supra* note 3 (compiling current data related to women, minorities, and people with disabilities studying and working in STEM fields).

137. Rochin & Mello, *supra* note 5.

IV. CONCLUSION

The gender and racial gaps in STEM are felt most deeply by the doubly discriminated—minority women. In the Double Bind Report, minority women scientists aptly stated in several instances that "it does not matter whether one is being hit with the club of sexism or racism—they both hurt."[138] Although many improvements have been made to help Hispanic women pursuing opportunities in STEM, we must continue to reveal the true roots of the problems currently plaguing this unique subset of women and promote programs that will help them rise out of the very bottom of the ranks in STEM.

Therefore, programs specifically geared toward aiding Hispanic women thrive in STEM should be designed as sub-programs of larger minority or women's agendas. Such programs should also receive specific allotments of funding so as to better address the unique issues that affect this community. Likewise, an increase in inclusion of women in general minority-supporting agendas, coupled with an increased inclusion of minorities in general women-supporting programs, will help to better aim efforts toward helping this specific subset of women.

However, it is important to keep in mind the program design suggestions of the Double Bind Report, stating that

> [W]hat works for one race or ethnic group in one part of the country will not necessarily be effective for a second group in another area. The minority groups must not be pitted against one another to compete for a disproportionately small share of funds and opportunities. Minority women must not be pitted against majority women or put under pressure to choose allegiance to either minority or women's groups.[139]

In targeting Hispanic women, ideal programs would expose them to STEM while still embracing their culture by offering ways to reconcile the notion of learning STEM with family-related obligations.[140]

It is also of the utmost importance to not only try to improve the *quantity* of Hispanic women in STEM, but to improve the *quality* of their STEM studies and careers. One goal of our policymakers should be to help those Hispanic women who remain in current STEM positions despite harsh or unfair treatment and help make the STEM arena a suitable and supportive one for the next generation of Hispanic women. Further-

138. MALCOM ET AL., *supra* note 24, at 3.

139. *Id.* at 31.

140. *See* Sy & Romero, *supra* note 43, at 222 (suggesting "efforts to help [female Hispanic] college students should focus on reducing the family obligations [they] need to fulfill on a regular basis, while maintaining the value of close family connections").

more, there should be ample support for female minority participation throughout the pyramid of STEM achievement shown in FIG. 1, with stronger support at the base.

In advocating for exposing students of younger ages to STEM, Irving Pressley McPhail, Chief Executive Officer of National Action Council for Minorities in Engineering stated that "companies and states [have begun] focusing on STEM at an earlier age and help students who have dropped out re-enter high school and community college . . . [y]ou've got to start early, beginning in middle school. Actually, if we had money, we'd begin [pushing STEM] in kindergarten."[141] By shifting more support to female minority youth, it will ensure that a larger pool of female Hispanic students will make it to the apex of the STEM pyramid in the future.

141. Jason Koebler, *Women, Minorities Vastly Underrepresented in Engineering Profession*, http://www.usnews.com/news/blogs/stem-education/2011/10/28/women-minorities-vastly-underrepresented-in-engineering-profession.