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Gender and STEM: Opting In Versus Dropping Out

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ABSTRACT

[Professor Jacquelynne Eccles](#) is Patron member of the [Network Gender & STEM: Educational and occupational pathways and participation](#). She and her colleagues have been developing the Expectancy-Value theory for more than 30 years (Eccles, 2009; Eccles et al., 1983), which provides an integrated framework to approach the question of why girls/women (and boys/men) make the choices they do, related to STEM or other fields. Since she started her research there has been a tremendous change; history has shown that the participation of girls/women in STEM can be changed by policy. In her keynote address at the first Gender and STEM Network conference in September 2012, in Haarlem, The Netherlands, Professor Eccles called for research to closely examine specific choices girls and women make and why, rather than why they may not choose certain fields of career. We are most pleased to include her overview of this event, '[Gender and STEM: Opting in versus dropping out](#)'. You may also access a video-link of Professor Eccles discussing her work here: <http://www.genderandstem.com/about/patron.html>

KEYWORDS

Gender; STEM; education; careers



Gender and STEM: Opting In Versus Dropping Out

What determines women's career choices? Choices are made from a wide range of alternatives. Which career any particular girl/young woman selects is based on two key belief systems – the system related to her confidence in being able to succeed at it, and the system constituted by the relative value she attaches to each career she is considering, particularly in light of what other things she hopes to do with her life. Many girls/women are interested in future jobs in which they can cooperate with and help others. Many girls/women are also concerned about how to balance work and family. These views play an important role in shaping their career choices. Girls/women opt into careers which fit their values, which, in turn, are influenced by gender stereotypical images from popular media and television. As a result, many develop quite stereotyped and often inaccurate views of what scientists and engineers actually do, and see these professions as incompatible with their desire to help others and to balance their family and work lives. They may thus reject certain "STEM" (Science, Technology, Engineering and Mathematics) career options, or not even consider them when making their future plans. We need to change these stereotypical images, go into the classrooms and show children/students what engineers really are and do for example, to show that one can have fulfilling careers in the physical sciences, technology and engineering. We should do so from an early age, because stereotypical images already start to develop in infancy, and postpone school career choices until children/students are prepared for making such choices.

Assertions that girls and women are less attracted to STEM than non-STEM professions at the overall level, are untrue. In fact, the pattern of gender differences in STEM participation varies widely across different STEM fields. This variation is even wider if we expand our definition of what a STEM field is; it is important for meaningful discussion to first define clearly what STEM is. If, for example, STEM teacher training is included in our definition of what constitutes STEM study majors, the number of girls participating in STEM increases dramatically. The same is true if we include medical professions as part of our definition. Different definitions will lead to different interpretations and interventions. At the end of high school young people have an image of what they want to become and pick their high school courses accordingly. For example, girls consider mathematics less important than boys and are likely to take the most advanced courses only if they consider these relevant to achieve their career goals. More boys than girls may undertake those courses, who need them for planned future majors in fields such as engineering.

This implies that interventions to enhance the value girls place on mathematics and physical sciences will have to take place at an early age. Teachers are important in this endeavour, because they have substantial influence on the attitudes of children and adolescents towards their studies. Advanced mathematics has been seen as a critical filter that inhibits girls from participating in STEM careers; but, perhaps the girls had already decided against careers which required advanced high school

mathematics. If this is true then girls' lower level of participation in STEM may be linked to other factors. We need to understand the choices which girls opt into, instead of a singular focus on why they opt out of certain STEM domains. This implies a focus on the career choices that girls and women actually make and why.

Motivations to work with others, to make a social contribution and for a family-flexible career are key determinants for the career choices of girls. When growing up, children develop different personal and social identities, and are attracted to careers that allow them to become the kind of person they want to be. For example: If one wants to help others, one is likely to be drawn to a career that will make this possible. If an individual believes that an engineer is someone who helps people, it will fit with her/his expectations. But, if the person's image of an engineer is that of someone who is only 'being technical', there will be a poor fit. So we need to provide better information for girls concerning what engineers do, for example, with the help of inspiring role models. Engineers *do* work with others and *can* help society. In communicating with girls about what different kinds of STEM careers involve, how they can allow for making a social contribution should be highlighted. At the same time, attention should be paid to these future workplace environments, to make them more cooperative, family-flexible, and compatible with girls' and women's goals.

REFERENCES

Eccles, J. (2009). Who am I and what am I going to do with my life? Personal and collective identities as motivators of action. *Educational Psychologist, 44*, 78-89.

Eccles (Parsons), J., Adler, T. F., Futterman, R., Goff, S. B., Kaczala, C. M., Meece, J. L., & Midgley, C. (1983). Expectancies, values, and academic behaviors. In J. T. Spence (Ed.). *Achievement and achievement motivation* (pp. 75-146). San Francisco, CA: WH Freeman.