

Gender Segregation in Higher Education

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Abstract

During the second half of the twentieth century, systems of higher education expanded and democratized around the world. Women's participation increased so dramatically that their numbers now surpass men's in many industrialized countries. But gender equalization has not occurred uniformly. Sex segregation of majors and degree programs is a striking feature of modern educational systems and a key reason for the ongoing social and economic inequality of women and men. While significant gender inequality is found within educational systems worldwide, recent evidence shows marked differences among countries and country groups in their degree and pattern of sex segregation. This essay reviews foundational research in this field, identifies emergent trends and cutting-edge lines of inquiry, and poses questions for future research on men's and women's distribution across educational institutions and fields of study. Much research on sex segregation in higher education has focused on cross-national differences and historical trends. A major question concerns the persistence of extreme gender differentiation even in the most economically and socially modern contexts. Research findings to date reveal a complex interplay between cultural beliefs, structural forms, and individual cognition in generating and maintaining sex segregation in the modern world. In order to advance research in this field, we suggest that future studies focus on: (i) how patterns of sex segregation differ by race, ethnicity, class, and national origin; (ii) how curricular preferences are formed; (iii) how characteristics of educational systems influence patterns of sex segregation; and (iv) how fields of study (and occupations) become defined as either masculine or feminine.

INTRODUCTION

During the second half of the twentieth century, systems of higher education expanded and democratized around the world. Women's participation increased so dramatically that their numbers now surpass men's in many industrialized countries. In fact, the majority of the *world's* higher education degree recipients are now women.

But gender equalization has not occurred uniformly. Sex segregation of majors and degree programs is a striking feature of modern educational systems and a key reason for the ongoing social and economic inequality between women and men. While significant gender inequality is found within educational systems worldwide, recent evidence shows marked differences among countries and country groups in their degree and pattern of sex segregation. These differences are often counterintuitive in that they do not correspond to what one would expect given other commonly cited indicators of women's status in countries around the world.

Much research on sex segregation in higher education has focused on cross-national differences and historical trends. A major question concerns the persistence of extreme gender differentiation even in the most economically and socially modern contexts. Research findings to date reveal a complex interplay between cultural beliefs, structural forms, and individual cognition in generating and maintaining sex segregation in the modern world. The present essay reviews foundational research in this field, identifies emergent trends and cutting-edge lines of inquiry, and poses questions for future research on men's and women's distribution across educational institution types and fields of study.

FOUNDATIONAL RESEARCH

EXPANSION AND FEMINIZATION OF HIGHER EDUCATION

Around the middle of the twentieth century, national policies started to emerge in Western industrial democracies that gradually redefined the role of higher education. The primary purpose of universities and colleges shifted from the training and socialization of (male) elites to the broad-scale production of human capital. Participation began to expand and diversify accordingly. In the United States, women's enrollment rates have been increasing since the 1960s, surpassing male rates by the early 1980s. As of 2010, women received 57% of all bachelor's degrees conferred in the United States. The female enrollment advantage holds for all large racial and ethnic groups: Blacks, Hispanics, Native Americans, Asians, and Whites.

The changes in higher education that first occurred in the United States and the affluent West are now evident worldwide. The number of tertiary (higher education) students reached 100 million by the turn of the twenty-first century, with women's global enrollment reaching parity with men's around 1990. As of 2007, the world female-to-male enrollment ratio was 1.08. However, countries and country groups continue to differ substantially in female representation. Men still comprise the majority of higher education students in less economically developed societies, and especially

large enrollment gaps persist where laws and cultural norms restrict female participation in the public sphere—in some Arab countries, for example.

Many scholars have interpreted steady increases in female enrollment as part of a secular or “evolutionary” trend toward gender equality and meritocratic value systems. From a functionalist or modernization perspective, the so-called degendering of public-sphere institutions is attributable to increased pressures for economic efficiency and the higher economic cost of discrimination in competitive market economies. For other scholars, cultural values are the driving force: according to sociologists John Meyer, Francisco Ramirez, and others, powerful egalitarian ideals have diffused worldwide through social movements, professional associations, and international organizations. Education is now seen as a fundamental human right and essential to national economic development and prosperity.

PERSISTENCE OF SEX SEGREGATION WITHIN HIGHER EDUCATION

Optimistic accounts of degendering are belied, however, by the persistence of strong segregation *within* educational institutions. While women’s access to higher education has grown dramatically over the past five decades, the distribution of men and women across specific fields of study has seen far less change—and the change that has occurred is not always in an integrative direction. Gender segregation across fields of study declined rapidly during the 1970s in the United States, but this trend flattened out by about 1985. Among 2010 degree recipients, the National Center for Education Statistics reports that women earned 80% of education degrees and 77% of psychology degrees, but only 18% of computer science and 17% of engineering degrees. The figure for computer science actually represents a decline since 2000, when 28% of degrees conferred in this field went to women.

We see similar patterns at the global level. From 1965 to 1990, sex segregation by field of study declined, but only slightly. UNESCO estimates that 70% of the world’s education degrees and 56% of the world’s humanities degrees went to women in 2008. In the same year, women received only 29% of science degrees and 16% of engineering degrees worldwide. But differences among countries are large. Contrary to what might be expected from modernization accounts of women’s changing status, recent studies have revealed that sex segregation across fields of study is not stronger (and is sometimes weaker) in less economically and culturally modern societies. Malaysia, for instance, boasts among the world’s most gender-integrated science programs, with women making up 57% of the country’s degree recipients. Women make up nearly half of engineering graduates in Indonesia, while some of the most male-dominated engineering programs are found in a very affluent collection

of countries that includes the United States, Japan, Switzerland, and Saudi Arabia.

The persistence of sex segregation by field of study should be cause for concern. Not only do degrees in female-dominated fields lead to lower paying jobs, but persistent sex segregation reinforces gender stereotypes and limits the range of perceived career options for younger generations. Moreover, the underutilization of female talent may be a threat to prosperity and economic development in some contexts, especially given severe global shortages of workers in scientific, technical, engineering, and mathematical (STEM) fields.

CUTTING-EDGE RESEARCH

National trends and cross-national patterns of sex segregation in higher education are difficult to reconcile with evolutionary accounts suggesting a declining significance of gender. Two lines of scholarship provide promising new analytical tools for understanding the persistence of sex segregation: one on the interplay between cultural gender beliefs and individual cognition, and one on the role of context, specifically organizational arrangements and cultural belief systems, in shaping patterns of sex segregation.

THE INTERPLAY OF CULTURE AND COGNITION

An important new stream of research on gender inequality considers how taken-for-granted cultural stereotypes influence individual cognition and behaviors. These analyses demonstrate that widely held beliefs about gender influence others' evaluations of our task performance in stereotypical directions. Biased assessments in turn lead us to judge *our own* competencies more favorably on gender-conforming activities than on gender nonconforming ones.

Shelley Correll's (2004) experimental research documents the powerful self-fulfilling effects of cultural gender beliefs. Correll purported to administer a test of "contrast sensitivity" to undergraduate students. Before the test, subjects were told either that men generally perform better or that men and women do equally well on the test (which, in fact, had no objectively right or wrong answers). In the first group, men evaluated themselves more highly than did women, and they were also more likely to declare aspirations to work in a job requiring "contrast sensitivity." These and other findings suggest that beliefs about gender difference—even if they are wrong—can produce gender differences in self-confidence and push us toward gender-conforming educational and occupational paths. These outcomes in turn reinforce stereotypes about men's and women's innately different affinities.

Cognitive biases about gender difference still affect those who choose non-traditional paths. Recent survey research on college students by Erin Cech and colleagues (Cech, Rubineau, Silbey, & Seron, 2011) found that female engineering majors regarded themselves as less professionally competent and less well suited to the professional culture of engineering than did their male counterparts. Lower professional role confidence contributed to attrition from the field.

Even those who do not believe in gender stereotypes know that many others do. People therefore expect to be held accountable to norms of gender-appropriate behavior. The behavioral manifestations of this cultural knowledge, sometimes termed *doing gender*, may include the choice of a gender-conforming major. For example, male students may wish to affirm their masculinity by choosing a technical field. Moreover, men and women may gradually internalize gender-conforming beliefs to which they are continually held accountable.

CONTEXT MATTERS

A second new stream of research explores how macrocontextual factors, such as organizational forms and cultural value systems, influence variability in sex segregation. Maria Charles and Karen Bradley (2009) have argued that some of the very same organizational forms and policy initiatives that encouraged increased female enrollment in higher education during the mid-twentieth century also exacerbated sex segregation within them. In 1953, for example, UNESCO issued a formal resolution that aimed to boost female representation in higher education by offering women more opportunities to specialize in fields well suited to “feminine aptitudes” and female careers paths. “Feminine aptitudes” were accommodated through establishment of 2-year institutions and expansion of programs in female-labeled fields such as home economics, health care, office administration, and hospitality.

Related research has explored the effects of so-called postmaterialist value systems on gender inequality. Comparative attitudinal research by Ronald Inglehart (1997) and his colleagues has shown a connection between national prosperity and the prioritization of self-expressive—as opposed to material—goals. Charles and Bradley (2009) have fused Inglehart’s cultural arguments with research on cognitive gender biases to build a framework for understanding the higher levels of sex segregation in affluent “postmaterialist” societies. In contexts where students are encouraged to “follow their passions” and to choose fields that they love, educational and occupational choices come to represent much more than practical economic investments; they are also acts of self-realization and individual affirmation.

Diverse cognitive biases may make young people *expect to love* doing things that they think others in their gender category love (and that they think they will be good at). As a result, individuals' efforts to self-realize very often align with prevailing gender conventions. Gender-typical choices in turn reinforce cultural beliefs about gender differences and may also bias expectations of the next generation. Consistent with the argument linking postmaterialist values with sex segregation, Charles, Harr, Cech, and Hendley (2014) found a larger gap between boys and girls in "liking math" and aspiring to a mathematically related job in affluent societies than in economically less developed societies.

KEY ISSUES FOR FUTURE RESEARCH

We see several ways of advancing the study of gender segregation in higher education. In particular, we suggest more research on (i) how patterns of sex segregation differ by race, ethnicity, class, and national origin; (ii) how curricular preferences are formed; (iii) how characteristics of educational systems influence patterns of sex segregation; and (iv) how fields of study (and occupations) become defined as either masculine or feminine.

HOW DO PATTERNS OF SEX SEGREGATION VARY BY RACE, CLASS, AND NATIVITY?

It is well known that educational outcomes differ by race/ethnicity, national origin, and class in the United States. But little is known about how patterns of sex segregation vary across these social group categories. Some recent research is starting to fill this gap. Yingyi Ma's (2009, 2011) studies of gender distributions across fields of study in the United States reveal some significant differences by race and socioeconomic status (SES). The latter was measured with respect to parents' education, occupational status, and income. Ma found greater sex segregation among whites than among other large racial/ethnic groups (2011), and she found that women from lower SES backgrounds are more likely to select scientific and technical fields than are women from higher SES backgrounds (2009). Ann Mullen's (2014) qualitative study of students at an elite, liberal arts university complements these findings. For the most part, women students were more likely than men to select majors on the basis of academic interests (rather than future career opportunities or earnings). The few women who did prioritize salary were from lower SES backgrounds. These studies raise some interesting questions. For example, are less privileged groups generally more likely to choose "practical" (as opposed to self-expressive) fields? Do patterns of gender segregation in immigrants' (or parents') native countries influence major choices in the receiving country?

HOW DO CURRICULAR PREFERENCES DEVELOP?

Girls' and women's attitudes toward specific fields of study vary a great deal across time and space. Knowledge about the formation of curricular and career aspirations could be broadened considerably by analysis of large-scale surveys or in-depth interviews conducted in less economically and culturally modern societies, and by greater attention to the post-1990 period, which was marked by continued growth in female university enrollments, especially in developing and transitional economies.

Because attitudes are tightly linked to outcomes, it is important that we identify forces that influence career aspirations and curricular choices. Potentially relevant factors include the visibility of gender-nonconforming role models at the societal, local, and familial levels. For example, young women's attitudes toward STEM fields of study might be influenced by the representation of women in STEM occupations at the national level, the intensiveness of STEM training in their secondary schools, and the visibility to them of female role models (including teachers and family members) in STEM occupations.

HOW DO ORGANIZATIONAL CHARACTERISTICS MATTER?

A third avenue for future research involves identifying how organizational features of educational systems influence patterns of sex segregation. Since World War II, educational systems in many countries have undergone major restructuring at both the secondary and tertiary levels. Changes have included diversification of institution types, proliferation of major programs, increased elective offerings, and choice-based curricular specialization. This structural diversification has made it easier for students in postmaterialist cultures to pursue personally selected, yet highly gendered educational pathways. Small-scale comparisons provide some evidence that girls and women are more likely to complete degrees in math and science in educational systems where curricular choice is restricted at the secondary level—either through policies that require all students to take math and science throughout the secondary years, or through performance-based tracking and course placement. Although such policies are clearly at odds with Western ideals of individual choice and self-expression, it is important that we learn more about whether they indeed weaken the penetration of gender stereotypes or reduce peer influence on later course taking.

Features of academic departments and research laboratories also warrant further attention. Mary Frank Fox (2000) has found that STEM departments that grant a high percentage of advanced degrees to women share some important features such as written guidelines for graduate study, a history of leadership on gender issues, and a faculty committed to creating a good climate for graduate education. She also has suggested that the widespread

“privatization” of graduate training, particularly within science and engineering, puts students’ fates in the hands of individual faculty who have little accountability to departments. In-depth interviews and ethnographies within these settings would help flesh out how the advisor–advisee relationship and the organizational characteristics of academic departments and laboratories influence the retention of graduate students in nontraditional disciplines.

HOW ARE FIELDS GENDER LABELED?

Finally, we see a need for more historical and qualitative research on the specific mechanisms by which curricular fields become gender labeled. Interactional and organizational challenges faced by women in male-dominated fields have been widely documented. But even when the local interactional and organizational climate is “female friendly,” taken-for-granted beliefs about the essentially masculine nature of core occupational tasks may operate to discourage female entry and weaken retention. Wendy Faulkner (2007), for instance, has shown how engineers draw symbolic boundaries between different components of their work (e.g., the technical and social dimensions) and between themselves and other professionals. These symbolic distinctions coincide closely with conventional gender binaries. As a result, gender stereotypes are reinforced and women’s sense of belonging in technical fields is weakened. Faulkner’s research focused on practicing STEM professionals, but future work might examine how these symbolic processes function in schools and universities. Cross-national research would be helpful in discerning differences in symbolic boundary work in countries with more or less gender-segregated STEM workforces.

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