2015

Men in the Food Lab, Women in the Engine Shop

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Abstract
Democracy’s colleges promised higher education opportunities to the sons and daughters of America’s working classes. Many land-grants had incorporated that promise in their degree programs by establishing majors aimed specifically at one sex. At their inception, home economics and engineering were among the disciplines considered discrete by gender. This bias remained well into the 1970s, about a hundred years later, before that supposed assumption came under strenuous attack. Bix’s essay provides a necessary corrective. She shows that a not negligible portion of both curricula contained members of the opposite sex almost from their beginnings. Students chose to major in what they wished rather than in some curriculum designated appropriate for them. These gender-benders did not escape notice. Sometimes they endured ridicule and questioning. But their successes in receiving the degrees of their choice proved the persistent flexibility of land-grants as well as their openness to change. By permitting students to take courses of study initially designed for members of the opposite sex, land-grants ultimately helped weaken barriers traditionally raised to keep men and women in separate spheres.

Disciplines
History of Science, Technology, and Medicine | Women's History

Comments
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Gendered Stereotype Breaking in Land-Grant Technical Programs

AMY SUE BIX

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At first glance, the early land-grant college system seems to embody the ultimate "separate spheres" division of the sexes, in which male students studied "agriculture and the mechanic arts,"1 while female students took
liberal arts, became teachers, and were concentrated in home economics. Crucial elements of that simple structure are at least partly true. Land-grant schools both reflected and reinforced conventional associations of engineering with masculinity and of domestic science with femininity. But in many ways, the more interesting part is where the paths grew more tangled and flexible, where the gendered history of land-grant education proves more complex. Seemingly straightforward boundaries assigning men and women to different academic fields turned out to be more permeable than they might initially appear. Both as individuals and in small groups, female students entered engineering from the late 1800s onward, while occasionally, some men pursued domestic-science classwork. Elements of gendered crossing-over occurred relatively early; indeed, the openness and novelty of land-grant colleges made them the only institutions in American higher education where young women and men of the late 1800s and early 1900s could experiment with choices of study most strictly associated with the other sex.

Establishment of Land-Grant Coeducation and Conventional Gendering of Academic Subjects

College coeducation in the United States originated at Oberlin, which began admitting female and African American students alongside white men soon after its founding in 1833, reflecting its reform-minded commitment to learning as a vehicle for cultural uplift. The notion of coeducation spread gradually before and after the Civil War, gaining particular momentum in midwestern and western states, while trailing in the conservative South. Some all-male schools adopted coeducation with reluctance as an economic strategy to boost enrollment, and especially in such cases, female students were often shunted aside with second-rate facilities, barred from receiving certain honors, and excluded from male-led extracurriculars or reduced to subordinate status.²

The Morrill Land-Grant Act, as passed in 1862, specified nothing with regard to coeducation; it did not stipulate and did not forbid teaching women and men in the same institution. Land-grant schools did not all open as mixed sex; especially in New England and the South, precedents of separate education often lingered. But historians such as Julie Roy Jeffrey and Andrea Radke-Moss have argued that an experimental frontier mentality made coeducation appealing in “western” locales that proved eager to
differentiate themselves from stodgy East Coast tradition. As husbands of educated women, progressive college presidents such as Iowa State's Adonijah Welch and Kansas State's John Anderson favored elements of women's rights. Supporters also believed that by having male and female students share a campus, states could save money and use women's "civilizing" presence to tame the roughhousing and violence of an all-male atmosphere.3

To many nineteenth-century parents, social observers, and even college faculty and administrators themselves, the whole notion of female higher education remained controversial. Critics had worried for years that advanced intellectual work for women risked transforming them into unnatural creatures, masculinized and diverted from proper feminine interest in home and family. Adding to such fears, respected Boston doctor Edward Clarke warned in 1873 that overly demanding college work endangered women during the most "susceptible" years of biological development and would foster a national epidemic of "female physical degeneracy." A teenage girl who tried to study as hard as boys did was "deranging the tides of her organization," Clarke worried, "divert[ing] blood from the reproductive apparatus to the head" so that "the ovaries . . . cease to grow [until] . . . the brain and the whole nervous system, disturbed . . . became neuralgic and hysterical." Clarke cited case studies of women whose long hours of study led to menstrual disorders and infertility, including one female student at "a Western college" who graduated at the top of her class but soon "began to show signs of failure." While "she had mastered . . . the secrets of chemistry, . . . she steadily ignored her woman's make . . . [trying] to compass man's intellectual attainment in a man's way, and died in the effort" from apparent "degeneration" of the brain. Clarke's book, Sex in Education, particularly condemned the new popularity of coeducation in "Western colleges" such as Iowa and Michigan, warning that their first female graduates might already have incurred serious "physical defects."4

Despite such criticism, coeducation represented an integral part of many of the earliest land-grant schools; by offering affordable, locally accessible education to both young men and women, founders hoped to enhance state development, economic growth, and social well-being. At mixed-sex schools, leaders had to consider how one of the Morrill Act's main missions—providing practical training centered on agriculture and mechanic arts—could apply to female pupils. Trustees at Iowa State College, which admitted women from its start in 1869, declared, "If young men are to be educated to fit them for successful, intelligent and practical farmers and mechanics, is it
not as essential that young women should be educated in a manner that will qualify them to properly understand and discharge their duties as wives of farmers and mechanics? We must teach the girls through our Agricultural College to acquire by practice a thorough knowledge of the art of conducting a well-regulated household." Iowa State adopted a "ladies' course of study," and its first official class in domestic economy appeared in 1871, under the title "Chemistry as Applied to Domestic Economy." Kansas State University created its domestic economy program in 1873–74, which started primarily as sewing, with additional lectures on hygiene, food chemistry, and dairying. President Anderson declared, "A girl has a right to an education as precisely adapted to a woman's work as is a boy's preparatory to a man's work." By 1877, Kansas State began offering women cooking and baking classes in its new "kitchen laboratory."

Land-grants did not begin in the 1860s by shunting all female students into home economics; indeed, that discipline did not exist as a coherent intellectual field when the Morrill Act passed. At some of the earliest land-grants, subjects for male and female students often overlapped, especially for first-year work in literature, philosophy, mathematics, and other basics. Even after Iowa State identified a distinct "ladies' course" in the 1870s, domestic economy remained a minor part of the curriculum; other requirements dominated, including liberal arts (history, political economy, Shakespeare, "study of words") and sciences (multiple courses in chemistry, botany, physics, psychology, anatomy, mineralogy, and meteorology). Early land-grants did not immediately offer women the option of earning degrees in domestic economy; the University of Wisconsin-Madison only established home economics as a department in 1903 and the University of Nebraska in 1908, while the University of California did not create its first domestic science classes until 1912. Female students instead claimed undergraduate degrees in general studies or science, especially favoring chemistry and botany; by the early 1900s, a small but tangible number chose other areas, including library science, commerce and business, pharmacology, and, as we shall see, even engineering.

Nevertheless, home economics increasingly served as a convenient default for female land-grant students, a gender-appropriate and hence respectable academic base to prepare them for marriage and "scientific home-making" and/or employment as teachers, extension workers, "women's page" reporters, or other gender-appropriate jobs. According to Radke-Moss, sixty-four out of sixty-six female students at Oregon Agricultural
College in 1892–93 majored in household economy, while twenty-six of the forty women who graduated from Utah State Agricultural College from 1894 to 1909 took domestic science degrees. Land-grant programs served as a vehicle to propagate the field, as early female graduates secured posts to inaugurate home-ec teaching in other colleges and in secondary schools. The field gained academic credibility with the formation of the American Home Economics Association in 1909, building on a decade of annual conferences held in Lake Placid, New York, where influential women and men defined the goals of their new discipline and outlined possible directions for teaching, research, and social impact.

During the late 1800s and early 1900s, land-grant colleges also institutionalized their teaching of engineering, expanding to encompass civil engineering, mechanical, mining, electrical, and a variety of other subdisciplines. As an occupation, engineering had been masculinized from its start in early modern Europe, growing out of traditions where rulers called on ingenious innovators to devise formidable new weapons, defense systems, and manufacturing machinery. Engineering training retained that military connection in the United States, centered on early nineteenth-century classes at West Point. But entry to the field did not depend on formal education; the majority of technical workers for many decades learned through hands-on experience in factories and in the field, helping build the Erie Canal and national railroad networks. These informal and academic contexts of engineering training had one thing in common: few women found a welcome on bridge construction sites or in heavy industry. As Ruth Oldenziel and other historians have noted, nineteenth- and early twentieth-century culture reinforced the single-sex identity of engineering through literary and professional rhetoric that added a epic tone to technical work, depicting engineers as macho heroes who built roads to conquer the wilderness. When land-grant schools added engineering departments, they naturally echoed those assumptions of engineering’s masculinity.

By the early twentieth century, in both philosophy and practice, higher-education authorities had established engineering as primarily an appropriate field for male students and home economics as primarily suitable for women; indeed, those gender identities formed key parts of each field’s self-image. But even as land-grant colleges steered men into engineering and women into home economics, they also created a potential for gender crossover that could not have been duplicated anywhere else in American higher education at that time. During the 1800s, colleges in the United
States multiplied dramatically, fragmenting to serve young people of different classes, genders, races, ethnicities, and locales. The culture at all-male schools varied widely; small New England colleges such as Amherst and Williams prepared men of modest background for teaching and the ministry, while institutions such as the University of Virginia focused on instilling gentlemanly character. Old-fashioned presidents still placed classical knowledge at the center of study, while innovators elsewhere experimented with broadening classwork to include more sciences and social sciences, architecture, and engineering. But across the board, from Harvard, Yale, and Princeton to newer and smaller schools, men's curriculum expansion stopped short of home economics. Fundamentally there was no logical reason for all-male colleges to embrace the study of domestic science.¹²

Nineteenth-century Americans also created a range of new schools to offer women opportunities for extended academic study, though as with men's colleges, female seminaries differed radically in their visions of the purpose of education and hence its content. Many finishing-school-type academies stressed music and similar arts as the means to instill proper feminine virtues in upper-class young ladies; others prepared women to meet an expanding nation's need for schoolteachers at relatively low wages. Some, such as Mount Holyoke and Bryn Mawr, aimed to match elite men's colleges in academic rigor and graduated pioneering generations of female scientists and other ambitious alumnae.¹³ Precisely for that reason, home economics never formed a major component of instruction at the "Seven Sisters"; many proud women faculty and administrators scorned it as beneath their intellectual dignity, too vocationally oriented.¹⁴

As much as the women's colleges of the 1800s and early 1900s differed from each other in some aspects, none offered female students a specialized training in engineering; technical studies simply had no place either in the ideal of cultivated feminine skills or in copies of the Harvard model. The engineering programs of West Point and all-male schools such as the Georgia Institute of Technology, Rensselaer Polytechnic Institute (RPI), and the California Institute of Technology excluded female students by definition. In short, all-male schools had no rationale or framework for offering men studies in home economics, and all-female schools gave women no opportunity to study engineering or, often, home economics. Instead, it was the Morrill Act schools that most commonly welcomed both genders and developed programs in both areas, under the banner of "useful arts." That history set the stage for a few individuals and small groups in the late 1800s and early 1900s
to explore studies that defied gender stereotypes. Land-grant colleges were by no means gender neutral or automatically fair to women, but inadvertently, by their very broadness, they created conditions under which a small but growing number of women would infiltrate men's fields and vice versa.

The very breadth of land-grant training allowed gender crossovers in other academic areas; over the past 150 years, the male-female composition of both agriculture and veterinary medicine has also shifted. Vet-med in particular transitioned from emphasizing large-animal farm practice to small-pet care, a change accompanied and facilitated by the entry of more female students. While such stories are crucial to the history of gender in land-grant colleges, this chapter focuses on the fields of engineering and home economics. Specialists in the history of engineering have just begun to trace the experiences of the earliest women in that discipline, while historians of home economics have largely reiterated and reinforced perceptions of the field as by definition female; there is little scholarship on the history of male home-ec students. Yet it is clear that both female engineering students and male home economics students existed, starting early in land-grant college history.

**Home Economics as Early Twentieth-Century Technical Education for Women**

By the early 1900s, domestic science professors conspicuously modeled their philosophy and teaching after (and in cooperation with) their institution's science and engineering programs. Land-grant schools carefully branded home-ec workspaces as "laboratories," terminology meant to differentiate their teaching from the unscientific bread-baking and dressmaking duties of mothers and grandmothers. In 1914-15, the Home Economics Department at the University of Wisconsin boasted of having "two food laboratories, two applied chemistry laboratories, one dietetic laboratory with practice kitchen . . . , one weaving laboratory, a textile laboratory, a dressmaking laboratory, a house architecture and house decoration laboratory, an art and design laboratory, [and] one applied arts laboratory . . . all . . . fully equipped with apparatus." Iowa State students referred to their course in textile chemistry and laundering techniques with the nickname "scrub lab." 15

Domestic-science teaching and research grew increasingly technical, incorporating elements of not just chemistry, physics, and biology but also engineering. At Iowa State in 1924, household administration graduate
student Eloise Davison test-taught a class focused on making women into modern “household engineers,” skilled in evaluating, purchasing, using, and maintaining the new types of kitchen equipment appearing on the market. Davison observed, “The whole modern period in which we live is an age of machinery,” so the “average homemaker” simply must “overcome” her lack of experience with technology.\textsuperscript{16} Significantly, the new class was a cooperative venture of Iowa State’s home-ec division and its agricultural engineering department. By 1929, Iowa State promoted equipment studies to the status of a department; its initial roster included not only female home-ec faculty but also mechanical engineering professor Herbert Sayre, signifying the perceived connection between engineering and equipment studies. Elements of engineering authority and masculine representation gave the new discipline legitimacy, but from the outset, women defined the field.\textsuperscript{17}

Other home-ec schools, including University of Minnesota, Purdue, Ohio State, and Washington State University, followed Iowa State in creating household-equipment courses. Equipment curricula embedded technical lessons squarely inside culturally acceptable boundaries of women’s knowledge; they incorporated engineering and science principles while safely segregating female students into alternate programs centered around their presumed sphere of interest: domestic life. Dozens of female students each year took multiple classes in equipment mechanics, gas and electric appliances, and refrigeration and home lighting, as well as an equipment seminar and “electrical laboratory.”

Professors insisted that students learn scientific and technical principles to understand how and why appliances worked (or didn’t). Hands-on experience reinforced theory; in “electrical lab,” students deliberately overloaded circuits, reading voltmeters and ammeters at each stage. Exercises assigned women to dismantle refrigerators and ranges, to assess construction quality and analyze how various features applied fundamental physics principles of temperature control. Seniors in home-refrigeration classes inspected installation of furnaces and air conditioners on local construction sites. Their final project involved planning a full household heating and cooling system, including technical specifications and cost estimates. Female students visited metallurgical and chemical testing labs of the Hoover Vacuum Cleaner Company, as well as General Electric’s Kitchen Institute.\textsuperscript{18}

Equipment courses undoubtedly thrived in part because women’s knowledge of domestic science did not challenge men’s leadership of pure science and engineering. Far from feeling threatened, Iowa State engineering faculty
cooperated in equipment teaching and research. But quite powerfully, equipment training served to subvert the notion of women's technical ignorance. Faculty and students conducted technical research and published results in experiment station newsletters and leading home-ec journals.

**Men in Cooking and Home Economics Classes before World War II**

It was not automatically predetermined that all subjects later identified with domestic science must inevitably have been identified as in the women's sphere. Ellen Swallow Richards linked her research and teaching in water purity at MIT to the male-dominated world of chemistry. Her protégé, Marion Talbot, tried to establish a sanitary science program within the Sociology Department at the University of Chicago in the 1890s, envisioning a field in which male and female experts together would reform city planning and address urban problems by applying insights from the physical, biological, and social sciences.19 The American Home Economics Association was headed by female presidents, but especially before World War I, influential men filled a number of its other leadership posts and helped edit its journal, including nutrition specialists C. F. Langworthy and Howard Knight, plus household-economics and accounting experts William Morse Cole and Benjamin Andrews, the latter a longtime professor in household arts at Columbia University's Teachers College.20

Even as gendered philosophies of land-grant schools linked home economics to female enrollment, authorities within the discipline continued to assert its universal applicability. In 1913, US Department of Agriculture nutritionist Langworthy noted that men often encountered topics such as food adulteration, dietetics, and environmental hygiene in science and medicine classes. He cited West Point and Annapolis cadet room inspections and clothing regulations as inculcating a sense of “ship housekeeping . . . [that] involves cleanliness and order and much that can be called home economics, though this grouping is without doubt far from the minds” of military authorities. “Men sometimes take courses in household arts at Teachers' College, Columbia University,” Langworthy noted, and such instances, combined with trade-school and military vocational cooking lessons, Boy Scout experience, and informal home lessons from mothers, meant that men's home-ec study, “though scattered and often incidental, is nevertheless fairly considerable in amount.”21
Teachers of home economics clearly positioned daily preparation of home meals as women's work, but food preparation elsewhere could shift into male territory. Between 1931 and 1940, Iowa State's home-ec department offered a course called “Fundamentals of Food Selection and Preparation,” specifically for men, with “principles of cookery, meal planning and preparation adapted to forestry, engineering, scout camps, and organized houses.”

Some men who registered were fraternity stewards who wanted to gain confidence in planning “well-balanced” meals; others liked the idea of being able to survive, even just on “simple dishes,” “if ever put on their own.” The course combined lecture and regular weekly “laboratory” sessions, where men prepared beef stock, boned rib roasts, and created “man-made” cookies and cakes. Instructor Louise L'Engle commented that the men’s “skill would put to shame some of the home-ec girls who flunk the ‘practical.’”

Reports of Iowa State men whipping up a full dinner that included sweet-potato soufflé and jellied vegetable lime salad elicited banter from fellow students, both men and women. One female home-ec student quipped that college women should consider making a “leap year proposal” to a veteran of the class, since “perhaps he'll agree to cook her bridge luncheons for her, and he'll do it well.” The male students themselves joked that they “suppose all the girls will be after them now.” But such comments underlined the fact that the course only meant to teach men cooking for temporary circumstances (“when the wife is away on a visit”) or in masculine contexts such as camping, a message that often appeared in other early twentieth-century discussions of “manly cooking.” There was no intention or desire for men to take over or routinely share women's obligation of producing breakfast, lunch, and dinner for a full family every day. The magazine produced by Iowa State's home-ec department commented, “Certainly the man who has taken Foods will appreciate the time and effort his wife spends in preparing meals and will recognize good food when he gets it.”

Cooking courses aimed at a male student constituency began to be offered at a number of other land-grant schools in this era, including state colleges and universities in Maine, Colorado, Minnesota, Idaho, and Washington. For several years prior to World War I, Professor Abby Marlatt, “chairman” of the Home Economics Department at the University of Wisconsin, taught “camp cookery,” listed as part of a roster of classes taught by women and, the rest of which were almost exclusively intended for female students. According to the 1913–14 catalog, the course was “intended especially for the Forest Rangers . . . [and] considers the food values, fundamentals of cookery
practice, balanced ration, and practice in using camp cookery utensils.”

In fact, even with the overwhelming female associations of home economics, social concerns about food, family, and home fostered the creation of some courses targeted to men that extended well beyond camp cooking. In 1925, at the request of male students, Dean Nora Talbot at Stillwater’s Oklahoma A&M College created a three-month lecture and laboratory course where her home-ec faculty taught nutrition, “table practice,” “standards of social conduct,” family economic life and relationships, and “selection and appreciation of dress in relationship to appropriateness and right values.” Though a few men dropped after discovering that home economics was not a “snap course,” popular demand from male students filled two sections in the following quarter. “For some time, home economics enthusiasts have dreamed, studied, and talked about the importance of educating the men as well as the women to an appreciation of the standards of home life,” instructor Florence Schertz declared. “The time when the school of home economics caters to women only is passing.”

Following similar impulses, North Dakota Agricultural College offered a class titled “Home Economics for Men,” which attracted an average of fifty-six students per year from 1926 to 1929. The course aimed to inform young men that they should not expect a “modern girl” to follow their mothers’ “old fashioned” lives, since “women have changed and progressed and... [in] the rapidly changing world, the home too is changing.” In order to promote marriage stability amid such flux, the course addressed “relationships between college men and women, courtship, engagements, family finance, incompatibility, other causes of divorce, preparation for parenthood, child training, health and recreation of the family, and... good standards of family life.” During the 1920s and 1930s, some home economists campaigned to expand their discipline to incorporate new studies of child development that could draw male as well as female students. But as historian Julia Grant has detailed, these “grandiose hopes that the participation of fathers in parent education classes would contribute to the construction of a more egalitarian family” did not sway male professors in psychology, sociology, and medicine, who feared that connections to feminized home economics would undermine their scientific stature.

Cornell offers the most dramatic example of gendered redefinition in the teaching of cooking and food science, plus decoration, textiles, design, and more. After World War I, the US hospitality industry enjoyed strong economic growth, and leaders felt pressure to modernize. Well-heeled clientele
had high expectations for service, and hotels had expanded into complex operations that needed well-organized meal service, laundry, housekeeping, and maintenance. To handle such demands, the newly formed American Hotel Association (AHA) sought to transform hotel management into an expert profession. While earlier generations of hoteliers learned on the job, advocates envisioned creating a new class of university graduates who combined knowledge of accounting, institutional efficiency, and business psychology with training in customer care, hospitality law, building engineering, and more. Given New York State's importance to the tourism and business-travel industry, Buffalo hotel owner John McFarland Howie approached Cornell as a natural site to develop the first bachelor's degrees in hospitality management. Though Cornell's president, classicist Jacob Gould Schurman, initially scorned the proposal as trade-school rubbish, Howie found key allies in home-ec faculty Martha Van Rensselaer and Flora Rose, who in 1911 had overcome resistance from fellow faculty to become the first women promoted to full-professor rank at the college. The School of Home Economics was housed within Cornell's Agriculture College, whose dean, Albert Mann, endorsed plans to create a hotel-training curriculum "centered around home economics."

Cornell's hospitality-management program opened in 1922, as part of the School of Home Economics, and was headed by Howard Meek, a mathematician who had earned his college tuition through summer work in resort hotels. The first class of twenty-two was entirely male, including some "sons of hotelmen," and up to World War II, men comprised the vast majority of degree candidates. Iowa State, Wisconsin, and other land-grants routinely trained female majors in institutional management, and numerous alumnae took jobs running restaurants and cafeterias, dormitories, clubs, and similar businesses. But the older men who dominated the AHA envisioned hotel management as an entirely male profession, and in being unfriendly to women, Cornell's hospitality program reflected that. One of the relatively few women who enrolled, 1926 graduate Dorothy Daly Johnson, recalled that Meek "had not wanted any women in the course and he gave all five of us a particularly hard time."

The roughly one hundred men (plus a handful of women) pursuing hotel-management degrees in the early 1920s followed a curriculum that crossed disciplinary lines and thus defied associated gender stereotypes. The class called "Hotel Engineering" taught building planning and construction, kitchen design, and specifications for elevators and plumbing,
heating, cooling, refrigeration, electrical, and other large-scale technological systems. Photographs show male students, shirtsleeves rolled up, working on steam engines and boilers in Cornell shops. In other photos, the men donned white aprons to work in a food-preparation laboratory, a context virtually identical to that of female home-ec majors in the same era. Male hospitality students took a battery of classes in cookery, foods, and nutrition, and, like female home-ec majors, their chemistry courses explained theory through applied lessons in mixing salad dressing. They studied mechanical drawing, economics, and accounting but also took required classes in textiles, decoration, and furnishing. As the program grew, female home-ec specialists, including designer Annette Warner and textile expert Beulah Blackmore, spent increasing amounts of time working with male hospitality students, while food-science instructors Jessie Boys, Irene Dahlber, and Anna Driscoll played key roles in shaping the program. The fact that the hospitality degree required male students to spend more time in kitchens and decorating studios than in machine shop, taking lessons from the same female faculty who taught female home-ec majors, did not erase all traditional gender expectations at Cornell. Indeed, the hotel school was built on—and throughout its early years reflected—assumptions that family cooking and household management were feminine chores, while a parallel knowledge of linens and cooking became masculinized when applied for pay in hotel employment.

But officially, male hotel-management students were enrolled in the home economics school, and other Cornellians teased them with the line, “Boy, you’re going to make some girl a good wife.” To add to the apparent gender oddity, the hospitality major proved popular among pre–World War II Cornell athletes. Robert Beck, former hotel-school dean, recalled that hotel majors comprised fourteen out of twenty starters on Cornell’s 1939 football team, unbeaten and ranked first in the country. Beck remembered, “When Cornell defeated Ohio State, the Big Ten Champion that year, one news report read, ‘Never in the annals of football has a Big Ten Champion been defeated by a team, two-thirds of whom were enrolled in the College of Home Economics.’” At other land-grant schools, individual men filtered into home economics. The University of Wisconsin had a scattering of male students who took textile chemistry and institutional management; Phillip Dakin’s experience in “advanced draperies” class and his role in producing the school’s 1933 student fashion show drew admiration from professionals, who subsequently
engaged him as a theatrical designer. In other instances, men potentially interested in home economics may have been discouraged or deterred by hostile faculty, counselors, and administrators. The University of Illinois restricted men from entering its Woman’s Building, the site of its Department of Household Science, as well as the swimming pool and gymnasium for female students. Upon entering Kansas State in the late 1930s, Harry Martin intended to major in chemical engineering but, inspired by his part-time job in college food service, shifted to dietetics, nutrition, and food management. “There was no men’s bathroom in the building,” Martin recalled. “Many male students took courses in the department, but I was the only one who attempted to complete the program. I called in one day and the administration said, ‘You’re not going to be able to get a degree.’ ... They didn’t want to give a home economics degree to a man.” The school’s president had simply vetoed awarding Martin a home-ec diploma, as confirmed later by College of Home Economics dean Ruth Hoeflin, who arranged for Martin and nineteen other men to receive belated home-ec degrees in 1980.

**Women in Engineering Classes before World War II**

Meanwhile, on the mechanic arts side of the land-grant equation, it was some of the land-grant schools that provided America’s first female engineering graduates at a time when Caltech, Georgia Tech, RPI, and other technical schools remained all-male institutions. Just six years after the University of California-Berkeley opened, Elizabeth Bragg Cumming was the first woman to earn a civil engineering degree there, in 1876, writing a thesis on a technical issue in surveying. In the 1890s, Iowa State granted civil engineering bachelor’s degrees to sisters Elmina and Alda Wilson. After Elmina proceeded to earn her engineering master’s degree from Iowa State, the school hired her to head its drafting room, then promoted her. As assistant professor of civil engineering, she helped plan a new campus water system. Bertha Lamme completed a mechanical engineering degree at Ohio State in 1893, then designed motors at Westinghouse.

In the early twentieth century, simply being a woman studying engineering was unusual enough to get your picture on the front page of campus papers at Iowa State and elsewhere. Under the cute headline “Beauty Meets Resistance,” the *Penn State Engineer* noted in 1934 that Olga Smith had become the first female enrolled in electrical engineering. Isolation made the experience hard for many of these individuals; one woman
in engineering at Cornell said: "A girl has to want . . . pretty badly to go through with the course in spite of the unconscious brutality of . . . [male] classmates. . . . She must be ready to be misunderstood, as . . . many . . . will conclude that she took engineering . . . to catch a husband. She must do alone lab reports and other work men do in groups—because men who are willing to face the scorn of their peers and . . . work with her are more interested in flirting than in computations. She must be prepared for a lonely academic career; she cannot approach her classmates to exchange notes without appearing bold." But slowly, the number of female engineering students at land-grant schools such as Illinois, Ohio State, Penn State, and Purdue began to add up, one or two at a time.40

At Cornell alone by 1938, more than twenty women had received engineering degrees; classmates attached the nicknames "Sibley Sue" and "Slide Rule Sadie" to these female engineering majors. Nora Stanton Blatch earned a civil engineering honors degree in 1905, then worked for construction companies and the water-supply board in New York City. Olive Dennis established a thirty-year career as an engineer and designer at the B&O Railroad. Female engineering students such as Blatch and Dennis remained a curiosity. Remarking on the intriguing rarity, a 1920s paper ran the headline "Three Coeds Invade Engineering Courses and Compete with Men at Cornell University: Stand Well in Their Studies." Alongside a photo of mechanical engineering junior Jeannette Knowles working on a compression-testing machine, the article noted that the three represented "the greatest number of women students ever enrolled [in engineering] at one time" at Cornell, attending class alongside over eight hundred men.41

Administrators did not encourage women to enroll in engineering; in fact, they did just the opposite. Gladys Tapman had to remind Cornell of its promise of instruction in any subject regardless of sex, before the dean agreed to accept her into civil engineering, where she completed her degree in 1934.42 Observers assumed that women literally did not belong in engineering; when Esther Knudsen and Ursulla Quinn arrived at the University of Minnesota as civil engineering majors in 1921, male classmates heard "the click-click of women's heels upon the tiles of man's last retreat at the University" and helpfully rushed to redirect the presumably lost female students to their proper building. Knudsen and Quinn both received engineering degrees in 1925, as the University of Minnesota student newspaper explained in an article reading, "Co-ed Engineers: Man's Domains Are Again Invaded. . . . and Man's sacred domains will be sacred no longer."43
An attempt at concerted change came at Purdue in the 1930s, where progressive president Edward Elliott supported bold thinking about opportunities for women. Elliott hired respected engineer Lillian Gilbreth to teach industrial management and mentor female students. Elliott also recruited famed aviator Amelia Earhart as another career consultant. Purdue had recently opened its first residence for women; with Earhart's high-profile appointment, female enrollment jumped 50 percent, and the new dorm overflowed. Both Gilbreth and Earhart encouraged female students to combine marriage with careers in engineering or science. In summer 1940, Ellen Zeigler and Kathleen Lux joined seventy Purdue men at the school's civil engineering camp, where the female "camper-ettes" joined men in playing baseball, swimming, and learning to use surveying equipment. Still, gender crossing in land-grant culture remained limited; as at other schools, few Purdue women chose to enroll in engineering, and among that handful, attrition proved high.

**Women in Engineering Studies during World War II**

It is, of course, impossible to estimate how many land-grant female students before World War II were interested in engineering, only to be sidetracked by self-doubts or steered into more traditionally feminine fields. World War II proved a crucial transition. As employers ran short of manpower, they began placing "Rosie the Riveter" on the shop floor; companies also sought to hire female engineers. Wartime pressures justified stretching gender boundaries, at least temporarily. The federal government, schools, and industry urged female students to serve their country by taking more engineering and science courses. At Penn State, at least sixty-five women signed up for special war classes in airplane and ship drafting.

Companies desperate for wartime help began recruiting women who had math and science skills, then gave those women customized crash courses to make them engineering aides. In one of the most elaborate programs, in 1942, the Curtiss-Wright airplane company began training what they called "Curtiss-Wright Cadettes," giving over six hundred women a ten-month immersion in engineering math and mechanics, theory of flight, airplane materials, drafting, job terminology, and aircraft production. It was no coincidence that five out of the seven colleges handling Cadette training were land-grants: Cornell, Iowa State, Minnesota, Penn State, and Purdue (the other two were RPI and the University of Texas).
The announcement of the Cadette program elicited joking about the notion of female engineers. Faculty had to adjust; Minnesota Cadettes remembered a “reputedly tough professor who strode into his first class and suddenly burst into uncontrollable laughter, eventually recovering to admit that he had never before faced 25 females wielding slide rules.” But Cadettes could claim to be doing their part for the war effort, and on that patriotic ground they were welcomed. Moreover, some skeptics ended up pleasantly surprised by women’s ability. Cadettes’ presence forced men to face questions about gender and technical work. Purdue’s 1943 yearbook noted, “Tradition . . . seems destined to vanish as demand for manpower opens careers for women in . . . fields heretofore . . . practically uninvaded by the fair sex.” An Iowa State publication editorialized, “Girls in the wind tunnel, the shop . . . caused engineers to wonder, then acknowledge, and finally resign themselves to the fact that there would be similar incursions as long as the war continues, and perhaps even after.”

Recognizing that many female students were still daunted by the prospect of entering the traditionally male world of engineering, inventive staff at Purdue sought special pathways to make women more comfortable with technical studies. In 1943, Purdue’s engineering school teamed up with the home-ec school to start a new program named “Housing.” Fifteen female students promptly enrolled, combining home-ec studies with physics, math, chemistry, and six general engineering classes, plus specialized work in civil, mechanical, and electrical engineering. Professors gave women technical knowledge of construction and remodeling, suggesting that graduates could find employment as consultants to home buyers or as lab technicians conducting research for building manufacturers. Based on the assumption that female students were natural authorities on the home, the program seemed to offer a safe middle ground for technical exploration. It reportedly appealed to women who were “glad of the opportunity to get something a little more revolutionary than the traditionally feminine field of home economics and yet not have to go to the extreme of entering the engineering schools that [men] insist upon preserving for themselves.”

The next year Purdue created another crossover course, meant to offer female home-ec majors intensive shop training. Nine women signed up to study plumbing, electrical appliances, and metal finishes. Instructors reported having to force women out of the machine shop after hours, as they practiced using precision measuring instruments, cutting and shaping wood, and filing, soldering, and riveting metal. Applying new skills,
the women designed and made bookends, wastebaskets, dishes, jewelry, ashtrays, and model railroad cars. Professor O. D. Lascoe argued that even housewives needed to understand modern engineering terminology and techniques. Again, the course underlined wartime erasure of strict gender lines. One observer commented that in machine shop, home-ec women “don their slacks, pin back their hair and really assume the role of a woman engineer,” stepping into “a field which, heretofore, was practically unheard of in women’s circles.”

At Iowa State, household-equipment majors found their mechanical knowledge in sudden demand, a valuable wartime commodity. Representatives of the Naval Research Lab traveled to Ames to interview equipment majors for engineering posts. At the suggestion of these recruiters, the home-ec program added extra work in algebra, trigonometry, and calculus to accelerate the women’s preparation for emergency employment. Home-ec majors could also sign up for special wartime electrical engineering classes; they earned the nickname WIRES (Women Interested in Real Electrical Subjects). Iowa State engineering professors reported that they had originally planned to give “these girls . . . elementary background [as] a gentle transition from biscuit baking.” As things turned out, one instructor said, anyone “who expect[ed] to see the girls changing a fuse or repairing a toaster cord [was] sadly disappointed. Baby stuff! They learned those things in their own equipment lab when they were freshmen.” WIRES were ready to pursue “more rugged topics” such as magnetic circuits, vector diagrams, transformers, and synchronous motors. Though Iowa State’s class yielded only a handful of graduates, WIRES immediately entered wartime testing and design work for General Electric (GE), Western Electric, and General Motors. Other Iowa State home-equipment students entered wartime engineering through on-the-job learning. Nine signed up for special training with GE to become engineering aides. During the day, they made calculations and graphs, calibrated instruments, and tested radio transmitters, receivers, and airplane motors. In the evenings, they studied engineering theory and practiced using slide rules.

Such connections between corporate engineering employment and Iowa State home-ec training continued into the postwar years. After finishing her home-equipment degree in 1951, Pat Traylor became a GE engineering aide, testing a new navy automatic pilot system and working on the manufacture of gas turbines. Traylor wrote that once she moved into the grease pits, “I made those test engineers swallow their guffaws about Home Ec majors!
I was certainly glad I had physics and household equipment mechanics courses and could use testing instruments.  

Women's classes in housing, household equipment, and shop and men's occasional classes in camp and military cooking did not in themselves aim to revolutionize the standard gender divisions of land-grant education. Such courses situated cross-gender study within very limited contexts and specific circumstances. Indeed, their definition reinforced men's customary links to public life and masculine space and women's emotional and practical ties to the home. At the same time, such nontraditional courses represented more than just idiosyncrasies. Their existence illustrated the potential gender flexibility of land-grant disciplines, foreshadowing a significant long-term trend, the broadening and redefinition of the original scope of home economics to make room for men, and especially the movement of women into mainstream engineering.

Along with the wartime crash courses designed to train women as temporary engineering aides in defense industries, World War II brought a burst of propaganda encouraging undergraduate women to pursue full engineering degrees. A Penn State magazine editorialized: “Here's to the Victory girl. . . . The girl who wields a slide rule as deftly as a Lord and Taylor creation. . . . She jumbles up all the old theories about this being a man's world. She can tell an engineer . . . to go to hell. She can even talk to . . . them about dynamos and two-way sockets without feeling like a damn fool. . . . Neat.” Schools were besieged by wartime employers searching for women who held engineering degrees. The University of Illinois flatly told companies not to bother coming to interview the lone eligible female graduating in February 1943 since she already “had countless offers for positions.”

Before the war, the one or two women enrolled at any one time at schools such as Cornell or Penn State were an anomaly. Wartime support brought extraordinary jumps in their numbers at many schools. By 1945, Purdue alone had eighty-eight women majoring in engineering, where a critical mass made life easier; aeronautics major Helen Hoskinson remarked, “Now that lady engineers are not a novelty on this campus, people no longer stare at the sight of a girl clutching a slide rule.” Among other land-grant schools, there were fifty female engineering students at Ohio State, forty-eight at the University of Minnesota, thirty-seven at Cornell, thirty-two at Illinois, twenty-seven at Wisconsin, and twenty-six at Iowa State. Overall, in November 1945, colleges and universities reported a total of 48,977 men enrolled in engineering courses and 1,801 women (at a time when Caltech,
Georgia Tech, and some other engineering schools still refused to admit women at all).\textsuperscript{57}

World War II brought a number of “firsts” for female students in engineering, as their enrollment climbed. In 1944, Iowa State civil engineering major Ruth Best joined thirty-three men selected for the Guard of Saint Patrick, one of the school’s main honor societies. The engineering magazine reported, “A woman invaded the Guard of Saint Patrick for the first time in the history of Iowa State College,” an initiation traditionally celebrated with an “informal smoker.” The next year the Guard welcomed two more women, including Maxine Goodson, Iowa State’s first woman graduate in chemical engineering. Eloise Heckert became the first female member of Iowa State’s chapter of Pi Tau Sigma, the honorary mechanical engineering fraternity; she had earned the highest grade point average in the entire first-year engineering class.\textsuperscript{58} In 1945, as the first woman elected to edit Iowa State’s engineering magazine, architectural engineering junior Mary Krumboltz wrote an editorial declaring, “Slide-rule-pushing girls are no longer a rarity. . . . We see them on our own campus and they are not the problem they were once expected to be. In fact, they are a problem only inasmuch as their fellow students and instructors choose to make them one.”\textsuperscript{59}

Even as wartime educators begged female students to enter engineering, many women still encountered resistance. Purdue’s Helen Hoskinson reported that one engineering professor turned and left the classroom when he saw her sitting there the first day. “He was sure someone had made a mistake and didn’t think it was he.” Other Purdue women complained that professors still spiked lectures with hoary sexist jokes. Patronizing male classmates annoyed women; one insisted that while she was serious about her studies, “there are too many boys who think you [women] take engineering to get dates.”\textsuperscript{60} Everyday experiences continually reinforced women’s sense of historically being outsiders; the frustration of trying to find ladies’ rooms reminded them that engineering schools were literally built for the opposite sex. One anonymous author commented:

\begin{quote} All young women, who have come to Penn State  
Listen to me, and let me relate  
The story of one who has learned the hard way  
That technical schools are no place to stay.  
When you’ve stood all morning and you’ve “got to go,”  
First, you’ll suspect—and then you’ll know \end{quote}
That the [engineering] buildings were made for men at Penn State;  
I assure you, my dears, they're not for his mate. . . .
So take my advice, and switch to Home Ec  
If you don’t want to become a physical wreck.61

**Men in Home Economics during and after World War II**

What about the other side of the equation, men studying home-ec subjects traditionally gendered female? During World War II, Iowa State's naval training program ran special courses for electricians, diesel mechanics, and firemen. Alongside that, Iowa State ran multiple sessions of a Cooks and Bakers School that prepared navy men to handle food preparation onboard submarines, aircraft carriers, troop-transport ships, PT boats, and at onshore stations. The program, headed by Iowa State home-ec professor Fern Gleiser, former head of the school's institutional management department, trained 280 men between 1942 and 1944. The navy had standard cooking procedures and expectations but no precedent for formal instruction in quantity cooking, so Gleiser and other Iowa State civilian faculty had to develop their own curriculum.62

The naval training four-month course included 132 hours of lecture and 432 hours of "laboratory" practice, conducted in regular college kitchens and meat-handling facilities. Iowa State taught navy students to use and maintain ranges, steamers, slicing and grinding and mixing machines, and a wide range of other kitchen equipment, to follow sanitation rules, to issue supplies, and to understand different types of storage. Like land-grant female home-ec majors, these military men learned to plan meals with an understanding of vitamins, minerals, and nutrition. They studied the dietary function, characteristics, and comparative advantages and disadvantages of fresh, frozen, canned, and dehydrated vegetables, as well as how to cook and serve each and combine them for optimum color, shape, flavor, and harmony with the main dish. Iowa State's female experts taught the men to master a long list of baking terminology, the characteristics of different varieties and grades of flour, and the chemistry of fermentation and yeast action. Students learned the reasons why pie crusts came out tough, soggy, doughy, burned, shrunken, or too thick or too thin, plus techniques for preventing such pastry problems. Iowa State course material described the perfect cake as "a work of art flawless in every way," teaching students to make angel-food, devil's food, sponge, marble, gingerbread, jelly-roll, and
at least eight other types of cakes in loaf, layer, and sheet form, plus multiple types of cookies, fruit cobblers, doughnuts, cream puffs, pies, puddings, coffeecakes, and other sweets. Under supervision by Iowa State institutional management instructor Mabel Anderson, navy men practiced making at least sixteen types of dressings, gravies, and sauces, a curriculum that in many ways replicated the civilian peacetime instruction given to young women studying home economics.63

Meanwhile, as civilian men vanished from Cornell during the war, male enrollment in its hospitality program plunged. While only twenty women had completed hotel-management degrees in the decade from 1933 to 1943, the program attracted forty-one women in 1944, comprising exactly one-third of the class of 122 students.64

Wartime provided an immediate rationale for military men to study food preparation, food chemistry, and nutrition under the guidance of female home-ec teachers. However, after World War II ended, powerful peacetime “norms” reasserted contrasting gender roles. Rhetoric from government, advertisers, and social commentators encouraged middle-class white men and women in particular to strive for an idealized convention of a bread-winning husband and homemaking wife, and to make room to rehire men, many employers discharged those “Rosie the Riveter” women who did not voluntarily quit. While wartime propaganda had pressured female college students to consider majors or at least taking some coursework in engineering, science, and math, postwar messages and trends in academic options reverted to a divide along the most traditional gender expectations. Of the 1,598 male students entering Iowa State in 1955, 890 (55.7 percent) chose to enroll in the division of engineering, 410 (25.6 percent) chose agriculture, 295 (18.5 percent) chose science, and just 3 men (0.2 percent) chose home economics. Of the 508 female students, 446 (87.8 percent) chose to enroll in home economics, a college that encompassed a range of areas, such as physical education. Fifty-one Iowa State women (10.0 percent) enrolled in science, while just 5 women (1 percent) chose agriculture, and 6 (1.2 percent) engineering.65 The Iowa State figures seem to have been typical of those of most postwar land-grant colleges. Margaret Rossiter has reported that nationwide, “only 97 men majored in home economics at the bachelor’s degree level in 1947–48.”66

But beneath this broad male-female gulf, subtle distinctions revealed a more complicated gendering of subject matter. Iowa State College split the study of foods into several subdivisions that conveyed distinctly different
implications for men and women. In 1947, Iowa State's home economics division had a "curriculum in foods and nutrition," while its Agriculture College contained a Department of Dairy and Food Industry, and the Science Division offered a curriculum in food technology, each with a unique gender profile. The home-ec "foods and nutrition" program supported majors in dietetics, nutrition, experimental cookery, and related sciences (such as chemistry). In 1947, all students in this program were female; the dietetics major enrolled no men and 130 women, experimental cookery had 32 women, foods and nutrition had 15 women, and 9 women majored in "related sciences." In sharp contrast, the Agriculture College's Department of Dairy and Food Industry was oriented toward the dairy business, stressing milk testing and inspection, cheese manufacture, dairy chemistry, and bacteriology. In 1947, it enrolled 95 men and just 1 woman. But the Science Division's "food technology" program had more room for gender crossover, under its focus on the "technological application of the sciences and engineering arts to the manufacture, transportation, storage, distribution, and utilization of food." Students undertook heavy requirements in chemistry, physics, and math, plus a three-month internship in a "branch of the food industry." Between 1946 and 1956, Iowa State graduated at least two women and five men in the food-technology major. The related program in "chemical technology" enrolled five women, amid seventy-four men, in 1947.67

As Margaret Rossiter has detailed, from the 1940s through the 1970s, many land-grant home-ec programs were racked by tensions with male central administrators, who scorned female instructors as an outdated embarrassment and rushed to replace them with younger male faculty. Rossiter depicts the outcome as a devastating story in which universities marginalized or excluded female staff from what had historically been one of the few areas where professional women had been able to secure advancement, exercise leadership, and serve as role models for new generations of students. "The changes could be brutal and humiliating, involving such deliberate ruptures with the past as . . . appointment of male deans lacking qualifications in the field," Rossiter writes.68

In the short term, female home economists at Cornell, Penn State, Wisconsin, and a number of other colleges lost ground in a zero-sum game with the odds stacked against women. But the longer evolution of home economics reveals a more tangled story about how evolving social mores and ideals of higher education played out in reshaping the self-defined scope of an entire discipline and its traditional associations of gender. Women
professors and administrators ultimately succeeded in reasserting their place in a rapidly changing field, establishing strong teaching programs and international research in areas ranging from marketing and consumer behavior and environmental science to high-tech textile research and development of nutritional space food for NASA.

Stereotypes of both men and women continued to permeate discussions of home economics and color expectations. In 1960, the University of Nebraska’s Arnold Baragar, associate professor of housing and equipment, hailed “the invasion of men into the teaching and research areas” as “an interesting and encouraging endorsement of the home economics profession.” While Baragar praised male faculty ready “to compete with women in home economics” as a positive indicator of male interest in the “improvement of family living,” he added that “men students in home economics are another story. I cannot conceive of men taking an entire home economics curriculum at the undergraduate level.” Loyal Horton, an Illinois college food-service director, quickly riposted that “not only can I conceive this but I did it and I am no quirk of nature,” having “invaded” the institution-administration major at Michigan State around 1946 with more than a dozen other men.

As it happened, the American Home Economics Association (AHEA) soon proved the error in Baragar’s assumption that it was unimaginable for college men to choose a concentration in home economics. In a 1965 survey, 65 out of 306 home-ec departments in coeducational schools reported that their list of 1964–65 majors included at least one male student; Oklahoma State University had 185 male undergraduate majors, and Penn State had 107. Those sixty-five programs together enrolled 701 men, almost 1.5 percent of the 48,000 students pursuing bachelor’s degrees in home economics across the country that year. Out of those 701 men, 297 chose to specialize in food-service management, 178 in applied art (often covering areas such as housing and interior design), and 117 in institution administration.

Absorbing men into a program designed around female students presented campus authorities with specific challenges. The University of Wisconsin, like other land-grant schools, required home-ec majors to practice applying their lessons under official supervision by spending several weeks living in a home-management practice house. As men’s enrollment grew during the 1960s, program leaders felt they could not allow the male and female classmates to live together. Engineering programs faced a parallel difficulty in figuring out how to integrate women; MIT leaders agonized
over how to provide proper accommodations for female majors at the outdoor camps used for training civil engineering students.\(^\text{74}\)

At the level of students' individual experiences during the postwar period, men studying home economics and women studying engineering faced parallel tensions, encountering suspicion and hostility from classmates and even faculty of the opposite gender. One man who earned a home-ec education bachelor's degree in the late 1970s reported that of professors at his state university, "There were those that were encouraging and supporting and those that were discouraging and wanted me out of there . . . I had to do some fighting. . . . I . . . understood where . . . having a guy with a beard and cowboy boots . . . sitting . . . with girls . . . with very nice outfits . . . and scarves, probably looked pretty much out of place." He recalled some "very harsh" grading and professors who "didn't want to talk to me." Gendered assumptions were embedded in official bureaucracy; just as women in postwar engineering programs received university correspondence addressed to "Mister," this man remembered getting letters calling him "Ms." and filling out forms that asked him to indicate a "husband's occupation." And just as male engineering majors accused female classmates of adopting feminine wiles to elicit special treatment from susceptible teachers, one man who completed a 2002 state-university degree in family and consumer sciences education remembered female classmates with Bs and Cs saying, "You're getting the A because you're the guy. . . . They're being easy on you because they don't want to discourage you. They want you to stay in."\(^\text{75}\)

During the late 1960s and afterward, those who were proponents (male and female) of bringing more men into home economics, as faculty and as students at all levels, cited feminist-influenced ideas about the changing nature of the family and a vision in which "Free to Be You and Me"-era boys and girls grew up to share domestic responsibilities. "Nowadays homemaking is man's work too . . . a joint husband-wife adventure," Luther Baker Jr., chairman of Central Washington State College's Home Economics Department and associate professor of family life, wrote in 1969. Denouncing the trap of gender stereotypes, Baker added, "There is no good reason why a dietician, nutritionist, textiles expert, housing specialist, or any other practitioner in the various areas of home economics should not be male. . . . With challenging exposure during the public school years, increasing numbers of qualified men could be lured into the exciting and fruitful adventure of home economics."\(^\text{76}\) Bemoaning the absence of men as junior high and high school home-ec teachers, male and female home-ec faculty at Ohio
State University and the University of Idaho in 1990 called for instituting new “recruitment and retention strategies . . . [and] career awareness opportunities directed specifically toward males, recruitment literature for men, and scholarships for male home economics majors.” They advocated having established male professionals serve as role models and mentors, to tell their stories at schools and meetings and hence “personalize [and] affirm” a nontraditionally gendered choice of work. That plan for actively courting and supporting male home-ec majors strikingly paralleled the measures that the Society of Women Engineers and other activists had already instituted to promote the recruitment and success of female engineering majors in American colleges.77

As it turned out, during these same decades, students, faculty, administrators, and others at land-grants and other colleges engaged in an impassioned intellectual and emotional debate over the very essence of the discipline of home economics. In 1969, Cornell adopted the new name “Department of Human Ecology” to represent desired modernization and broadening of the field, and by the mid-1980s, more than 70 of the 387 colleges offering undergraduate home-ec degrees had also rebranded themselves. Names play a crucial role in how a discipline is perceived, by both insiders and outsiders; while some observers bemoaned a painful destruction of tradition, others welcomed the promise to invest teaching and research with renewed vigor and relevance. Not coincidentally, as schools redefined home-ec programs as “family and consumer sciences,” “human development,” or “human sciences” and merged their traditional scope with elements of economics, education, and business training, the number of male students rose. In 1969, men had comprised just 1.7 percent of home-ec undergraduate students nationwide; by 1983, that figure had more than tripled, to 5.8 percent. University of Missouri football player Robert Curry told reporters that his home-ec major and ambition to run and own day-care centers had earned him “some ribbing from the guys at first. . . . But they’re catching on.”78

Historians, sociologists, and psychologists have emphasized the disincentives for men to enter fields previously associated with women, such as nursing, social work, and elementary education and child care, which typically carry lower pay, benefits, and prestige. While those occupations might appeal to men for reasons having to do with personal satisfaction or economic necessity, only all but the most self-confident men who opted for “women’s work” could ignore emotionally fraught conflicts of gender identity, heightened external scrutiny, or peer stigmatization. Just as women
who entered engineering programs faced both internal and externally imposed pressure to assess what statement that nontraditional direction made about their femininity, so men who enjoyed home economics found that preference often raised culturally laden questions about masculinity.

Under the influence of feminist thinking, some reform-minded school districts of the 1970s started requiring or encouraging all boys and girls to take both home economics and shop, though students and parents sometimes reacted negatively. By the 1990s, the reinterpretation of home economics as “work and family studies” or “life-management education” reinvigorated that trend, encouraging secondary schools to replace lessons in cooking and sewing with units on relationships and parenting skills, communication, nutrition, and “teen living.” In 1968, boys accounted for only 4.2 percent of the 2.2 million pupils taking home-ec classes in seventh-through twelfth-grade home-ec classes, but by 1993, enrollment had reached 5.3 million, with 41.5 percent boys.

By 2004–5, men made up 27 percent of the students in the University of Georgia’s College of Family and Consumer Sciences. In 2005, Iowa State University combined its College of Family and Consumer Sciences with its College of Education to form a new College of Human Sciences, offering degrees in early childhood, elementary, and secondary education, entrepreneurial studies, kinesiology and health, diet and exercise, dietetics, hospitality and event management, nutritional, culinary, and food science, family finance, apparel merchandising and design, family services, and more. Under that widened umbrella, men comprised about 20 percent of Iowa State’s College of Human Sciences in 2010. Eighteen men majored in the apparel program in 2009, compared to just three in 1995. Some observers attributed male interest to popular-culture trends such as the television reality show *Project Runway* that gave high-visibility appeal to the glamor of modern clothing design, a movement echoed in culinary science by new media attention to “foodie” culture and the transformation of chefs into celebrities. At Oklahoma State University, which still had a separate education college, men earned 62 out of 430 undergraduate degrees in human sciences in 2008–9 (14.4 percent), 58 out of 461 in 2009–10 (12.6 percent), and 52 out of 370 in 2010–11 (14 percent). Over the long term, the gender shift in home economics and the repositioning of the discipline again showed the flexibility embedded within the land-grant model, enabling its teaching and research to stay relevant over the decades, to a wider audience.
World War II did not magically remove all institutional barriers to women wishing to study engineering. Toward war's end, Cornell started to worry about women taking up too much room on campus. To make room for male veterans, administrators imposed an artificial cap, ordering all departments except home economics to block admission of any new female undergraduates for spring 1945. The engineering dean had already approved admission of nineteen first-year women to join eighteen already enrolled; Cornell's vice president scolded the engineering school for exceeding its quota of twenty-five women and forbade it from accepting even one more woman that semester. 

Postwar numbers of female engineering students plunged steeply, but they never entirely vanished; after reaching new lows in the early 1950s, female ranks again climbed, finally approaching World War II levels by 1957. In 1949, there were 763 female students enrolled in engineering at schools across the United States; by 1957, that total had more than doubled to 1,783. Since men's engineering enrollment also rose over that period, female students still constituted well below 1 percent of the total engineering-student population. During the 1950s, roughly 10 to 15 percent of all male college graduates earned degrees in engineering; by contrast, women completing engineering degrees amounted to 0.2 percent or less of all female college graduates.

Even though female undergraduates remained a tiny minority, some land-grant engineering schools acknowledged their presence and occasionally even sought to recruit more. In 1952, the University of Illinois's engineering school bulletin courting potential students carried two images of female students working alongside men in machine shop and encouraged female high school students with good grades in math and science to "seriously consider the possibilities of engineering careers."

But many male and female parents, counselors, high school and college teachers, and even university administrators still refused to believe that women could or should seek technical degrees on equal terms with male classmates. In 1955 Eric Walker, dean of engineering at Penn State, wrote an article titled "Women Are NOT for Engineering" in which he asserted that investing time and effort to teach female students didn't make sense, since most simply did not have the "basic capabilities" needed to handle technical work. At most land-grants during the 1950s, female engineering
majors faced a campus climate that remained chilly, or even toxic, discouraging some to the point of dropping out.

To combat both overt discrimination and more subtle discouragement, a core of activist female engineering faculty and professionals mobilized, incorporating as the Society of Women Engineers (SWE) in 1952. Purdue’s engineering women formed a student section two years later, followed soon by other land-grants such as Iowa State. College SWE chapters undertook a wide range of activities to provide mentoring, networking, and other forms of support; they paired first-year women with “big sisters,” hosted talks by industry representatives, organized panel discussions, distributed women’s résumés, and more. To encourage more girls to view engineering as a real and exciting career option, college women gave presentations at elementary and secondary schools, ran Girl Scout programs and summer camps, and helped with SWE’s national outreach efforts.89

SWE’s support for women in engineering came at a time when the climate of the field had started to change at a number of institutions. The early 1960s extended the distinct upward trend of female enrollment; for example, the Engineering College at the University of Illinois had twelve women enrolled in early 1960 but twenty-four in 1963, twenty-six in 1964, thirty-four in fall 1965, and thirty-seven in spring 1966.90

SWE chapters multiplied and extended their efforts, calling attention to such issues as sexual harassment and highlighting ways in which women engineers’ concerns were connected to broader issues of the second-wave feminist movement. Meanwhile, a crucial core of allies, some faculty (male and female) and administrators at land-grants, organized institutional efforts to encourage more young women to consider studying engineering and to help them succeed. Today, it is virtually impossible to find a land-grant campus that does not have programs supporting women in science and engineering. In the 1950s, women were less than 1 percent of all engineering students in the United States; in 2010, women comprised 18.1 percent. Out of the twenty-five schools that granted the highest numbers of engineering degrees to women in 2011, seventeen of them were land-grants.91

**Conclusion**

This history of how small groups of students made nontraditional choices at land-grant schools offers revealing lessons about the powerful ways in
which different fields of study became associated with a particular gender and about the circumstances that permitted stretching those "normal" boundaries. Gendered connotations of home economics and engineering did not disappear, as revealed in ongoing jests about men learning to cook and women learning to use machinery. Few, if anyone, anticipated (or perhaps even desired) a time when both those fields would draw equal numbers of female and male majors.

Instead, it was the multidimensional definitions of science and technology within the land-grant context that allowed room for small-scale crossovers to occur more gradually. In shaping a new hospitality degree that required male students to master both the female-led area of food science and the masculine study of hotel-building technology, Cornell literally brought hundreds of men into the home-ec kitchens. In redefining household studies to include an expertise in refrigerators and other equipment, Iowa State and other land-grant schools gave female students an accepted gateway to technical studies at a time when they were discouraged from pursuing traditional engineering degrees. Special programs set up for particular purposes encouraged opportunities for further crossovers. By institutionalizing a specific course in its catalog, Iowa State's home-ec program endorsed the value of teaching men to cook, albeit for appropriately gendered use in fraternities, on camping trips, and in outdoor labor. The Iowa State WIRES program, Purdue's housing and shop classes for women, validated the idea of giving women access to technical knowledge and hands-on tool experience.

The histories of men learning traditionally female subjects and women learning traditionally male subjects were not precisely parallel. Starting in the late 1800s, Elizabeth Bragg Cumming, the Wilson sisters, Bertha Lamme, and a few other women earned engineering degrees, one by one. Land-grant schools did not set up any special curriculum just for them; those women earned civil and mechanical engineering degrees identical to those of men. Their individual interests in engineering studies drew them to follow that unusual path, often defying administrators and faculty who regarded that choice as inappropriate. By contrast, men entered home economics in sizable numbers at Cornell only after the growing hotel business encouraged the school to create a uniquely masculinized degree that would facilitate men's employment in the new profession of hospitality management. For its part, the engineering profession displayed no active interest in welcoming women until World War II, when the national manpower
emergency fostered temporary efforts such as the special wartime technical classes program and Curtiss-Wright training to draw female students into engineering.

After World War II, gender patterns in the fields of both home economics and engineering changed. Margaret Rossiter has argued that it was the quest for academic prestige that led several universities to maneuver more male faculty and administrators into home economics after the war, at great personal cost to the female pioneers who had built and sustained that field. By contrast, no schools of that era made concerted efforts to court female engineering faculty or deans, and doing so would not have increased respect for a department.

During the postwar period, a number of the nation's women engineers sought to make that field more appealing and accessible to new generations of young women. The Society of Women Engineers organized outreach efforts, mentorship programs, and other forms of encouragement for women with talent and interest in technical work. Such campaigns gained strength during the 1960s and beyond, finding support from the second-wave feminist movement, civil rights law, and broader social shifts in education and gender. Today it is virtually impossible to find a land-grant school (or other university) that does not boast about having a SWE chapter and a wide variety of other support mechanisms for women interested in engineering. By contrast, while some advocates from the 1960s onward favored bringing more men into home economics at all levels (secondary, undergraduate, graduate, faculty) to reflect both a desirable broadening of the field and a modernization of family realities, there were few organized efforts or national support mechanisms to attract more men. The increase in male students during this era reflected something different: the redefinition of the discipline and its increasing overlap with fields such as education, often as a result of financial pressure in university administration or other institutional trends.92

Today the historically gendered fields of engineering and home economics (however relabeled in today's parlance) remain far from achieving gender parity. Indeed, both disciplines still stand out as among the most gender imbalanced in the modern university. In the United States in 2009–10, women earned 87.7 percent of all bachelor's degrees in "family and consumer sciences/human sciences" (FCS/HS); the highest percentage female among twenty different fields listed by the US Department of Education,
and little changed from the 87.5 percent figure of 1999–2000. The field had grown during that decade; in 1999–2000, US colleges issued a total of 16,321 bachelor’s degrees in FCS/HS, 14,288 to women; in 2009–10, the nation produced 21,818 FCS/HS graduates, 19,132 of whom were women. In dramatic contrast, just 16.8 percent of all bachelor’s degrees in engineering and engineering technologies in 2009–10 went to women, the lowest percentage female of all listed areas. That figure represented a significant drop from the 1999–2000 level of 18.6 percent, though the total number of engineering degrees earned by women rose, from 13,655 out of 73,323 in 1999–2000 to 14,896 out of 88,729 in 2009–10.

Many activists for women in engineering bemoan the fact that the dramatic increase over the 1980s and 1990s in women’s share of degrees has leveled out, apparently stalling or even declining substantively in certain specialties. Gendered stereotypes continue to exert a powerful influence over perceptions; despite the best efforts of the feminist movement and reform-minded educators, many Americans still reflexively associate technology and engineering with men and link food and household-related interests primarily with women.

In the big picture, however, land-grant colleges helped alter an essential reality of gender and academic discipline. While a woman choosing to study engineering in the late 1800s or the early 1900s was likely to face criticism or discouragement in many quarters, while a man in Cornell’s home-ec hospitality program in the 1920s became the target of jokes, students making similar choices today encounter far less (if any) opposition and ridicule. It was the land-grant schools that first created the chance for such crossovers, a gender-bending opportunity that would have historically been impossible at either traditionally all-male or all-female colleges.

Men studying foods, textiles, home decor, and clothing design and women studying engineering were certainly not what the authors of the Morrill Act had envisioned. But such gender crossovers came to represent a key part of land-grants’ 150-year history. They reflected broader cultural patterns, including the influence of World War II, second-wave feminism, civil rights law, and social trends such as new emphasis on nutrition and consumer sciences. Land-grant history thus represents a strong case study of a bigger historical question of how American society has gendered different forms of knowledge and how popular assumptions about what’s proper for men and proper for women have been reshaped, at least partially, over decades.
Notes


7. Eppright and Ferguson, A Century of Home Economics at Iowa State University, 3.


13. Ibid.; Helen L. Horowitz, Alma Mater: Design and Experience in the Women’s Colleges from Their Nineteenth-Century Beginnings to the 1930s (New York: Knopf, 1984); Margaret Rossiter, Women Scientists in America: Struggles and Strategies to 1940 (Baltimore: Johns Hopkins University Press, 1982).
14. Vassar incorporated some elements of home economics under the label "eugenics" from the 1920s through the 1950s, but such classes failed to attract many women and were not widely imitated among the other colleges that made up the Seven Sisters. Barbara Sicherman, "College and Careers: Historical Perspectives on the Lives and Work Patterns of Women College Graduates," in Women and Higher Education in American History, ed. Faragher and Howe, pp. 130–64.


23. Kathryn Soth, "It's Leap Year, Girls . . . And These Men Can Cook!" The Iowa Homemaker 12, no. 2 (May 1932): 1, 13.


25. Soth, "It's Leap Year, Girls," 1, 13.


30. Julia Grant, "Modernizing Mothers: Home Economics and the Parent Education


33. Ibid., 50.

34. Ibid.

35. Ibid., 52; Robert Beck, introduction to Hospitality Leadership, xi.


40. “Beauty Meets Resistance,” Penn State Engineer, October 1934; and Raymond...


44. Ellen Zeigler, “Ross Camp,” Purdue Engineer, October 1940, 10, 14; Kathleen Lux, “Following the Civils,” Purdue Engineer, November 1941, 42.


48. Marjorie Allen, “Cadette Column,” Iowa State Daily Student, March 5, 1943: 2; “Fifty Years of Aeronautical Engineering: University of Minnesota, 1929 to 1979” (Department of Aerospace Engineering and Mechanics, University of Minnesota, Minneapolis, 1979); Purdue University yearbook, The Purdue Debris, 1943, 20.


51. “Interview Women for Naval Jobs,” Iowa State Daily Student, October 9, 1942, 3; “Require Equipment Majors to Add 5-Hour Course,” Iowa State Daily Student, October


55. G. A. McConnell to Kenneth Meade, December 19, 1942 and March 29, 1943, box 70, folder “dean of women,” 2/9/1, Willard Papers, University of Illinois Archives.

56. Peggy Stef en, “Coed Engineer Comes Through Over Comments of ME Faculty,” Purdue Exponent, July 22, 1943, 1; “University’s 30 Girl Engineers Have Gripe: Male Engineers Scorn Their Big Ambitions,” Purdue Exponent, August 9, 1944.


60. “University’s 30 Girl Engineers Have Gripe”; Peggy Stefen, “Coed Engineer Comes Through Over Comments of ME Faculty.”


64. Cornell made the Hotel School a separate college in 1954, no longer officially part of the College of Home Economics. Edmondson, Hospitality Leadership.


7/2/3, file 1/2, Special Collections Department, Parks Library, Iowa State University; Becky Jordan, Iowa State University archivist, personal correspondence with the author, September 14, 2012. In 1990, the Agriculture College's former Dairy and Food Industry Department merged with the former Home Economics College's Foods and Nutrition Program, forming a new Department of Food Science and Human Nutrition, jointly administered by the two colleges.


71. Ibid.


74. Apple and Coleman, "Domestic Science to Human Ecology."

75. Carol Werhan, "Why Men Enter the Gendered Profession of Family and Consumer Sciences Education: An Exploratory Case Study" (PhD diss., University of Akron, 2008), 46–47, 49–50, 64.


85. George Sabine to S. C. Hollister, November 22, 1944 and July 4, 1945, Hollister to Sabine, July 2, 1945, 16/2/2077, box 44, 71, Cornell University Archives.


89. Bix, “From ‘Engineeresses’ to ‘Girl Engineers’ to ‘Good Engineers.’”


