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Training for transformation: examining food systems courses at US land-grant universities

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Higher education institutions can play an essential role in preparing students to participate in movements for just and sustainable food systems change. For the past two decades, many United States land-grant universities (LGUs) have developed food systems education (FSE) courses. This study examined the extent to which FSE courses employ four capacities deemed crucial by the FSE literature: multidimensional approaches, interdisciplinarity, centering equity, and training students to take action in food systems. The syllabi of 171 undergraduate courses at 20 LGUs were obtained by contacting instructors, and their course descriptions and learning outcomes were analyzed. This subset of LGUs were identified from the membership list of the Menus of Change University Research Collaborative (MCURC), a nationwide network of colleges using campus dining halls and classrooms as living laboratories for food systems change. Most course descriptions and learning outcomes exhibited multidimensional approaches and interdisciplinarity. However, many failed to incorporate teaching content and practices that help students critically examine equity and social justice issues in food systems, or engage in transformative change. LGUs have both the resources and urgent responsibility to empower students to be part of movements to transform unjust, unsustainable food systems. The findings of this study, and an accompanying open-access syllabus website, aim to accelerate the development of FSE curricula that prepare students to change food systems.

KEYWORDS

critical pedagogy, food systems, education, social justice, equity, land-grant universities, syllabus analysis

1 Introduction

The world must urgently transition to more just and sustainable food systems. Agriculture is responsible for one fourth of global greenhouse gas emissions (Poore and Nemecek, 2018) and occupies 38% of the global land surface (Tilman and Clark, 2014; FAO, 2020), making it a leading driver of deforestation and biodiversity loss (Willett et al., 2019). Simultaneously, food insecurity—the lack of access to "sufficient, safe and nutritious food" (Odey et al., 2022)—is a global public health crisis that manifests as

hunger in some contexts, and overweight or obesity in others. The FAO (2023) estimates that globally, 1 in 10 individuals live with hunger. Over 1 in 8 people live with obesity (Phelps et al., 2024). Diet is a leading contributor to cardiovascular disease, type 2 diabetes, and some cancers (GBD 2019 Risk Factors Collaborators, 2020; Afshin et al., 2019). Worldwide, it is estimated that 1 in 5 deaths, or 11 million deaths per year, are attributable to unhealthy diets.

Indigenous people, people of color, and low-income people endure climate change, contamination of air and water, land degradation, and diet-related disease disproportionately and most acutely (Achiume, 2020; Achiume, 2022). Furthermore, modern food systems are built on land and labor extracted from these marginalized groups (Alkon and Agyeman, 2011; Holt-Giménez and Shattuck, 2011). For over five centuries in the United States (US), settler colonists and colonizing institutions have attempted to erase Indigenous bodies, knowledge, and foodways (Dunbar-Ortiz, 2015). As recently as 158 years ago, enslaved Black people grew the majority of America's food; until the 1930s, formerly enslaved Black people and their descendants farmed as sharecroppers in relative debt-slavery (White and Redmond, 2019; Myers, 2022). Today, Black farmers constitute a minute fraction of their prior landholdings. The erosion of Black land ownership is due largely to racist land and financial lending practices, enacted with the USDA's complicity (Tyler and Moore, 2013; Bustillo, 2023). Today, an estimated 40% of US farmworkers are undocumented immigrants (USDA ERS, 2023). Many are undercompensated (Levkoe et al., 2016), and some work for no pay under slavery-like conditions (Holmes and Bourgois, 2013; Rawal, 2014). Urgent action is needed to transform food systems from violence—upon human bodies, cultures, animals, and the environment—to health, justice, and sustainability.

Such a transformation requires a shift in public consciousness and social momentum (Allen, 2008; Holt-Giménez and Shattuck, 2011; Anderson et al., 2019; Kelinsky-Jones et al., 2023). In his groundbreaking *Pedagogy of the Oppressed*, Paulo Freire (1968/2000) describes how educators can prepare students and the public to participate in major social shifts through "praxis". He writes, "Oppression is domesticating. To no longer be prey to its force, one must emerge from it and turn upon it. This can be done only by means of the praxis: reflection and action upon the world in order to transform it" (1968/2000, p. 51). Higher education institutions in the United States can serve as sites for transformative praxis (Hooks, 1994; Niewolny, 2021; Allen and Gillon, 2022; Jones, 2023). In particular, land-grant universities (LGUs) play a significant role in shaping US food systems by advancing food systems research and educating hundreds of thousands of students pursuing careers that will influence food systems (Schuh, 1986; Grant et al., 2000; Jacobsen et al., 2012; Buttel, 2005; Kelinsky-Jones et al., 2023). While much of the LGU system's historical foundations and current incentive structures are rooted in injustice (discussed below), many scholars argue that in this pivotal global moment, LGUs can play a crucial role in training students for action toward just, healthy, sustainable food systems (Galt et al., 2013b; Ammons et al., 2018; Ostrom, 2020). The literature demonstrates the importance of numerous capacities for FSE courses, including multidimensional approaches, interdisciplinarity, centering equity, and training for action. This study asks: to what extent were these four capacities being taught at a subset of US land-grant universities?

2 History of the US land-grant university system

In 1862, the Morrill Land Grant Act mandated the creation of an affordable university in each state dedicated to preparing Americans for careers in agriculture, engineering, and other applied fields. Prior to this legislation, higher education in the US had largely taught the humanities and catered to the elite. The Act increased access to higher education and vastly accelerated US research, innovation, and enterprise. LGUs have since housed the majority of the US's public agricultural research, teaching, and community engagement.

While LGUs vastly expanded educational access in the US, originally they did so almost exclusively for the benefit of White men. The construction of LGUs was funded through US state governments' sale of 10.7 million acres of land seized from 245 Native American tribal nations (Lee and Ahtone, 2020). Furthermore, Black Americans could not attend LGUs in the states that did not allow them to attend college (Lee and Keys, 2013). In response to activism and advocacy led largely by Reconstruction-era Black community organizers and politicians (Soares, n.d.) legislators passed the Morrill Land Grant Act of 1890, which ruled that segregated states must designate a "separate but equal" affordable LGU for Black students. There are nineteen such LGUs today, known as "1890 institutions," which include some of the US's largest Historically Black Colleges and Universities (HBCUs). The 1862 institutions have accrued wealth by owning land on and beyond their universities. On the other hand, the 1890 institutions were granted yearly state and federal funding instead of land. The 1890 Act required that states fund their 1862 and 1890 LGUs equally, and a failure by states to match one-to-one funding makes 1890 institutions ineligible for federal funding. Most states have grossly underfunded their 1890 institutions, which disqualifies those universities from full federal funding as well, because federal funding is tied to matched state funding commitments (Partridge, 2023; Smith, 2023). The 1890 LGUs have experienced an estimated $12.8 billion of illegal underfunding over the past three decades (Adams, 2022), and have eight times fewer endowment assets per student compared to 1862 LGUs (Partridge, 2023). The 1994 Morrill Land Grant Act further established numerous LGU Tribal Colleges and Universities (TCUs), which as of 2022 numbered at 35 (Benson, 2022). The TCU LGUs not only did not receive land, but their federal funding has also been grossly disproportionate to the 1862 and even 1890 institutions (Phillips, 2003; Lee and Keys, 2013). Federal funds support LGUs via two types of grants: annual, formula funded capacity grants and competitive grants for which institutions must compete. Among federal capacity funds issued in 2022, 1862 LGUs received $659,989,424 (an average of $11,578,762 per institution); 1890 LGUs received $142,882,763 (an average of $7,520,145 per institution); and 1994 LGUs received $4,809,191 (an average of $137,405 per institution; 84 times fewer than the 1862 LGUs) (Partridge, 2023).

The deep, structural inequities that underlie American society are reflected in the history of the LGUs (Buttel, 2005; Lee and Keys, 2013; Stein, 2020; Lee and Ahtone, 2020; Ahtone and Lee, 2021). However, the history of LGUs need not construct a path dependency toward a future of deeper inequity. The food and agricultural influence and infrastructure of LGUs—alongside their active historical role in perpetuating social, environmental, and food injustice—imbue these institutions with a responsibility to help lead in training new leaders to build just, healthy, sustainable food systems (Ammons et al., 2018).

3 The evolution of LGU food systems pedagogy

In the first decades of the 20th century, the impact of LGUs on national and global food systems was marginal (Buttel, 2005). In the 1930s and 1940s, however, LGU research led to the development and commercialization of hybrid corn varieties that radically bolstered US agriculture. The ensuing Green Revolution—a global yield-increasing intensification of agriculture enabled by new biotechnology and mechanization techniques, accelerated by Global North financial institutions and agro-chemical corporations (Holt-Giménez and Shattuck, 2011; Holt-Giménez, 2017)—deepened the impact of LGU research. This era reached a peak with the 1970 Nobel Peace Prize awarded to Norman Borlaug, who transformed the literal and intellectual field of crop science through the development of high-yield wheat. This "golden age" of the LGUs was characterized by a "productionist" philosophy, by which "increased production is intrinsically socially desirable, and that all parties benefit from increased output. Productionism emphasized the collective benefits of new technology and implicitly concealed the social costs of technological change and the unequal ways in which the benefits of new technology are distributed" (Buttel, 2005, p. 2–3). During the 1970s and 1980s, this trend coincided with the widely documented neoliberalization of US higher education (Slaughter and Rhoades, 2000; Orphan and O'Meara, 2016; Troiani and Dutson, 2021). Federal investment in higher education shrank and universities increased tuition. LGUs increasingly sought private sector funding from companies such as Monsanto, Kent Corporation, Syngenta, and Archer Daniels Midland (Classens et al., 2020; Hettinger et al., 2021). Corporate research funds increasingly replaced public funding, and molecular biology and genetics became the most important sphere of agricultural research (Buttel, 2005; DeLonge et al., 2016; Miles et al., 2017; Classens et al., 2020). These interrelated trends caused LGUs to generate more single-disciplinary research and teaching, which narrowly pipelined students toward technical careers and served industry over the public interest (Salvador et al., 1995; Lieblein et al., 1999; Grant et al., 2000; Lieblein et al., 2004; Warner et al., 2011). In the 1980s, many LGU educators sought to contest this trend (Schuh, 1986; Gates, 1990). They developed food systems education (FSE) curricula that emphasized deeper environmental, health, and social action by emphasizing systems thinking, multidimensional approaches, interdisciplinarity, experiential learning, teamwork, and critical thinking (Hilimire et al., 2014; Cargill, 2005; Hamada et al., 2015). Early LGU programs including Pennsylvania State University's Agroecology major, Montana State University's Sustainable Food and Bioenergy major, and UC Davis's Sustainable Agriculture and Food Systems major, established in 1997, 2009, and 2011 respectively, served as models for action-oriented, community-engaged food systems programs (Karsten and Risius, 2004; Parr and Van Horn, 2006; Parr et al., 2007; Jacobsen et al., 2012; Jordan et al., 2014). FSE programs spread nationwide, at LGUs and beyond (Jordan et al., 2005; Weissman et al., 2012; Holt, 2015; Elsemore et al., 2019). Assessing the availability of interdisciplinary food-related programs in the US in 2015, Hartle et al. (2017) found there were 82 undergraduate majors, minors, and certificates offered at 63 universities and 58 graduate Masters, PhD, and certificate programs at 42 universities. Valley et al. (2020) reported 79 undergraduate majors and minors and 29 graduate Masters and PhD programs in "sustainable food systems education" across 89 universities in the US and Canada. Over 30 of the universities identified by Hartle et al. and Valley et al. as offering FSE programs are LGUs. Numerous working groups and conferences within and beyond LGUs have formed to advance these new teaching models. Among these are the establishment of the Agriculture, Food, and Human Values Society in 1987, the Sustainable Agriculture Education Association in 2006, and the Inter-Institutional Network on Food, Agriculture, and Sustainability in 2010 (Inter-Institutional Network for Food, Agriculture, and Sustainability (INFAS), 2018; The Agriculture, Food, and Human Values Society, n.d.). The Menus of Change University Research Collaborative (MCURC) was founded in 2014 as a network of professors, students, researchers, university dining executives, food companies, and chefs striving to enact more healthy, sustainable food systems through universities. It created a research and education working group dedicated to sustainable food teaching and learning, as well as multi-site research using dining halls as living laboratories. The MCURC holds monthly meetings and annual conferences, conducts research and education interventions, and works with universities to implement healthy, sustainable, delicious food options.

4 Calls for deeper equity, justice, and action

Despite this expansion of FSE teaching strategies and literature, numerous educators identify key remaining gaps. Namely, while many FSE courses today may successfully employ multidimensional approaches and interdisciplinarity, many still fail to explicitly acknowledge and engage with historical and present injustices in food systems and their intersections with race, gender, class, and power (Meek and Tarlau, 2015; Meek and Tarlau, 2016; Classens et al., 2020; Aguilar, 2021; Valley et al., 2020; Corkery et al., 2021; Livstrom et al., 2022). In 2016, Meek and Tarlau identified that "despite the growing scholarship on food systems education, there is a paucity of critical perspectives on its pedagogical methods, learning outcomes, and overarching objectives" (p. 1). Such gaps may be due to instructors' lack of exposure to or willingness to employ critical pedagogy, trauma-informed pedagogy (Sterling et al., 2021), or social justice perspectives; explicit resistance by stakeholders who benefit from the current unjust and unsustainable food system (Kelinsky-Jones et al., 2023); conservatism in agriculture departments (Archibeque-Engle, 2015; Martin et al., 2019; Martin and Hartmann, 2020); lack of diversity among food systems instructors and students training to become instructors (Warren and Alston, 2007; Griffin et al., 2020); and implicit or explicit racism and other discriminatory attitudes among instructors, students, and extension agents (Harris, 2008; Martin and Hartmann, 2020). By avoiding an exploration of systemic oppression and its role in shaping food systems, FSE classes can become color-evasive (Annamma et al., 2017), White-centric, and depoliticized, mirroring broader trends within US alternative food movements and failing to engage in transformative praxis (Slocum, 2007; Guthman, 2008; Flowers and Swan, 2011; Molina, 2012; Rosing, 2012; Etmanski, 2012; Burdick, 2014; Cadieux and Slocum, 2015; Flowers and Swan, 2015; Jones, 2019; HEAL Food Alliance, 2020; Wozniacka, 2021). This commentary mirrors those of other disciplines which underwent a critical transformation in teaching and learning, such as gender studies. Hooks (1994) reflects on the period in which "again and again

black female activists, scholars, and writers found ourselves isolated within feminist movement[s] and often the targets of misguided white women who were threatened by all attempts to deconstruct the category 'woman' or to bring a discourse on race into feminist scholarship" (p. 121). She then describes how Black feminist scholars—including queer scholars—instructors, students, and community members began revolutionizing the discipline toward deeper inclusion and intersectionality. In the 1980s, Robert Bullard and his contemporaries helped centralize race and class in environmental scholarship and pedagogy, founding the study of "environmental justice" (Bullard, 2000). Within the past fifteen years, many commentators have called for a similar disciplinary evolution in FSE. Courses that prepare students to grapple with equity are not only urgently overdue, they argue, but are also necessary to effectively train students to transform food systems (Classens et al., 2020).

Numerous educators have attempted to address this lack of equity-centered and action-oriented courses by developing new food systems pedagogical frameworks. Prominent FSE scholars—many published in the Frontiers research topics "Critical and Equity-Oriented Pedagogical Innovations in Sustainable Food Systems Education" of 2020–2023 and "Critical Praxis and the Social Imaginary for Sustainable Food Systems" of 2022-2023—present reviews and interventions which integrate literature and teaching experiences into new frameworks for equity-centered FSE instruction (Galt et al., 2012; Galt et al., 2013a; Galt et al., 2013b; Burdick, 2014; Meek and Tarlau, 2015; Valley et al., 2018; Bezner Kerr et al., 2019; Valley et al., 2020; Ebel et al., 2020; Corkery et al., 2021; Sterling et al., 2021; Aguilar, 2021; Horner et al., 2021; Belarmino et al., 2022; Fanshel and Iles, 2022; Livstrom et al., 2022; Nordstrom et al., 2022; Otieno et al., 2022; Jordan et al., 2023; Stephenson et al., 2023; Valley et al., 2023). One of the most widely-cited frameworks developed in the past decade is Sustainable Food Systems Education, which aims to "support post-secondary students across a range of disciplines in developing the knowledge, skills and dispositions to effectively address complex challenges in the food system…[and] engage in collective action toward transforming the food system" (Valley et al., 2018, p. 1). Another prominent framework is Critical Food Systems Education, which aims to "prepare individuals and teachers to transform the food system, and help communities attain food sovereignty" (Meek and Tarlau, 2015, p. 1). Personal narratives on equity-centered FSE teaching by Guthman (2008), Burdick (2014), Reese (2018), Aguilar (2021), and Tyler (2023) add experiential context to these frameworks. Reese, for example, describes her approach to teaching food studies at Spelman College, a historically Black womens' college:

> Black women, whose visible connections to food are often demonized through narratives of the unhealthy body, are being trained as thought leaders in food-related fields. From courses on the unequal distribution of food to food chemistry, black women students are not the object of study at Spelman. They do the studying. In my courses, we peel back layers of inequality in the global industrialized food systems. We explore how global formations like anti-black racism shape food access worldwide. We also explore resistance. Our students are interested in social problems, yes. And they want to learn how to shape and change the world around them (2018, n.p.).

Aguilar (2021) reflects on how traditional food systems curricula have perpetuated an erasure of history, dismissal of her own and colleagues' expertise, and lack of belonging for people of color in food systems education. She details her efforts to combat this trend by centering readings and perspectives by people of color, including those that spotlight people of color as leaders, experts, and innovators. She also engages students in community partnerships which enable them to situate their intersecting privileged and oppressed identities in the real-world food system. Tyler (2023), bringing a Black agrarian feminist lens to her food systems teaching, explains,

> We are building on the literal bodies and the victories and the struggles and the suffering of our ancestors, so we are literally standing on their shoulders, pushing forward the work that they died for – the work that they hoped we would carry on through their legacies. Learning and caring for Black ag history is important from a spiritual level, cultural level, political, social, economic level, but to us, it's all intersectional." (n.p.).

Numerous organizations and researchers have developed resources to help FSE instructors implement more justice and equity content and teaching strategies into their courses. Belarmino et al.'s (2022) survey of 66 LGU FSE instructors uncovered that many instructors seek resources including FSE case studies, lesson plans, and reference lists regarding food systems topics and their social justice intersections. In response, they developed, tested, and disseminated four FSE modules at four universities. Faculty from the University of British Columbia, Montana State University, and the University of Minnesota used a participatory action-research process to develop a food systems curriculum centered on collective action—"the shared understanding, will, and ability of a heterogenous group to take action and work together toward a common goal" (Jordan et al., 2023, p. 1). In 2021, University of British Columbia researchers analyzed the content areas, course goals, and learning outcomes of fifteen food justice course syllabi from universities in the US and Canada to assess the current state of food justice education and developed the first phase of an "Understanding by Design" framework to deepen student learning (Corkery et al., 2021). Furthermore, the Sustainable Agriculture Education Association and the Agriculture, Food, and Human Values Society jointly maintain a syllabus database of food justice syllabi. Iowa State maintains a Food Systems Practitioner and Education Resource Database, and the University of British Columbia developed the Just Food toolkit for helping train and provide modularized lesson plans and activities for instructors seeking to integrate equity more deeply into their food courses (SAEA, 2020; University of British Columbia, 2020; The Agriculture, Food, and Human Values Society, 2022; Iowa State University, 2024). Despite these pedagogical innovations, an analysis by Valley et al. (2020) that assessed online program descriptions, program learning outcomes, and 13 syllabi from 108 food systems programs in the US and Canada found that only 18% involved any engagement with equity topics, only 6% grappled with race, 3% with gender, and 3% with socioeconomic class. Corkery et al.'s (2021, p. 10) analysis of fifteen food justice syllabi (which, due to sampling, are more likely than non-justice-focused FSE course to explore race, gender, and Indigeneity) found that only 60% of syllabi content areas included race, 47% included gender, and 33% included "decolonizing food systems and Indigenous food sovereignty". These findings suggest that the recent widespread proliferation of FSE teaching resources has not yet transformed FSE pedagogy to engage more deeply with

themes of race, class, gender, Indigeneity, and other social justice-related topics.

5 Study aims

This study takes a deeper look at how food systems classes are being taught at LGUs. By analyzing the course descriptions and learning outcomes listed in 171 syllabi from 20 campuses, this study illustrates the extent to which current food systems courses employ multidimensional approaches and interdisciplinarity, center equity, and train students for action. Such domains contribute to praxis—the critically-informed reflection and action necessary to bring about change (Freire, 1968/2000). Of the 111 LGUs across the US, this study examines the 21 which are also members of the MCURC (2023). We have chosen to examine the LGUs that are members of the MCURC because several of our co-authors have been active participants in the MCURC for many years. The MCURC is deeply committed to transformative, action-oriented education in food systems, and includes a ready audience of early adopters for acting upon the findings of this study. We also have access to broad MCURC dissemination channels, including meetings, conferences, and online communications.

Higher education is one tool among many needed to transform food systems. LGUs have a critical opportunity to train the next generation of leaders to pave the transition toward more just, healthy, and sustainable food systems. The authors hope that this snapshot of the state of LGU FSE pedagogy provides teachers and learners with more tools to continue interrogating into the future: why—despite many attempts to generate innovative teaching frameworks and resources over the years—do most FSE courses fail to center equity and train students for action? What obstacles might be preventing the successful evolution of FSE pedagogy toward transformative praxis, and how can we overcome them?

6 Materials and methods

As of 2023, there were 111 land-grant universities (NIFA, 2023a). In 2023, the MCURC included over 60 university members, including 21 LGU campuses (MCURC, 2023). These 21 LGU MCURC campuses are the sample for this study. During the 2022–2023 school year, together they comprised over 550,000 undergraduate students (College Navigator, 2022). For each university, the undergraduate course catalog for academic year 2022–2023 (including summer 2023, when available) was accessed and searched for the keyword "food" in the course title or description. A list (*List #1: Food Courses*) of each of the courses that included the keyword "food" was created. Second, the course titles and course descriptions of each course in *List #1* were read, and those that fit the criteria of FSE were advanced to *List #2: FSE Courses*. Synthesizing various definitions of FSE from Meek and Tarlau (2016), Hartle et al. (2017), and Valley et al. (2020); we defined FSE as courses that focus on more than one dimension of food systems (e.g., environment, society and culture, or health) and employ more than one academic discipline (e.g., economics, nutrition, political science, history). Courses that only examined environment, society and culture, or health alone, or that employed only one primary academic discipline, were excluded from *List #2: FSE Courses*. Third, the professors of each of the courses in *List #2: FSE Courses* were emailed to request their syllabi. The Stanford Institutional Review Board (IRB) determined that this research did not require IRB review.

The syllabi included in *List #3: FSE Syllabi Obtained* were uploaded to Dedoose Version 9.0.107 (2024), a qualitative analysis software. For each course, the departmental listings were recorded. This analysis specifically examined two syllabus components: course descriptions and learning outcomes (these two components are henceforth referred to as "syllabi" for brevity). Each sentence of the course description and each learning outcome was identified as an excerpt and coded line by line. Through six iterations of inductive analysis, CH and NC developed a content analysis codebook with the adjudication of MW (Patton, 1990; MacQueen et al., 1998; Patton, 1999). CH applied the codebook to each of the syllabi (Table 1).

ML, CW, and JB provided further feedback on the development of the codebook and its definitions, and all authors advised on data interpretation. While we have varied disciplinary expertise, all the members of our team employ critical approaches to studying food systems, community health, and education. Seven of the authors have attended LGUs, but only one attended an LGU beyond California. We followed the Standards for Reporting Qualitative Research (SRQR) (O'Brien et al., 2014). Below, the criteria for each codebook category are described. See the Supplementary materials to view the complete codebook.

6.1 Multidimensional approaches

We determined if a course employed a multidimensional approach by assessing the extent to which the dimensions of environment, society and culture, and health were addressed in the syllabus. We chose these three dimensions inductively; they emerged as consistent categories across most syllabi. To code syllabus excerpts as "environment," "society and culture," or "health," we inductively developed a list of keywords and concepts associated with each dimension. Excerpts from the syllabi were coded as one or more of these dimensions if they included words such as the following:

- "Environment": *environment, ecology, climate change, pollution, soil, water, greenhouse gas emissions, environmental justice, organic, sustainable, GMO, Traditional Ecological Knowledge*.
- "Health": *health, nutrition, hunger, diabetes, food security, obesity, public health, SNAP, school meals, health equity*.
- "Society and Culture": *society, culture, religion, spirituality, recipes, culinary arts, cooking, traditions, livelihoods, rural communities, social justice, social movements, food justice, food sovereignty, equity, Indigeneity, tribal food systems, Traditional Ecological Knowledge, power, oppression, race, war*.

Syllabi which included no more than one of these dimensions were excluded from the sample, *unless* their online course descriptions or lists of lecture topics included more than one dimension of food systems.

TABLE 1 Content analysis codes.

Multidimensional approaches	**Centering equity**
• Environment	• Equity Content Level 1
• Health	• Equity Content Level 2
• Society and Culture	• Equity-Centered Practices Level 1
Interdisciplinarity	◦ Applying Class Topics to the Real World
• Agroecology	◦ Assessing the Impact of Individual Choices
• American Studies	◦ Comparing Different Contexts
• Anthropology	◦ Considering Life Cycle Impacts
• Art	◦ Critical Thinking
• Biology	◦ Developing Leadership Skills
• Business and Marketing	◦ Effective Communication
• Civic, Urban, or Alternative Agriculture	◦ Experiential Learning
	◦ Navigating Difficult Situations
• Culinary	◦ Teamwork
• Data Science	◦ Using Diverse Information Sources
• Ecology	• Equity-Centered Practices Level 2
• Economics	◦ Acknowledging Traditional Ecological Knowledge
• Education	◦ Assessing Positionality
• Engineering	◦ Celebrating Diversity and Differences
• Environmental Studies	◦ Contesting Systems of Oppression
• Geography	◦ Dialogic Learning
• History	◦ Intersectional Thinking
• Horticulture	◦ Valuing Lived Experience
• Nutrition	**Training for action**
• Political Ecology	• Community Engagement
• Political Science or Law	• Career Planning
• Philosophy	• Farming, Gardening, and Culinary Skills
• Psychology	• Impacting Policy
• Sociology	• Participating in Social Movements
• Writing and Literature	

6.2 Interdisciplinarity

Excerpts of syllabi were coded as a particular discipline if the discipline was referenced by name or if the excerpt included references to teaching skills or frameworks characteristically employed by that discipline. For example, a syllabus from a course in The Ohio State's Engineering and Natural Resources program states, "We then engage in a broad review of the scientific literature on a range of both incremental and transformative approaches to improving the sustainability of these systems, paying close attention to both environmental, social and economic outcomes." The course uses scientific literature to explore "economics" and "environmental science" which were encoded. A course in Cornell's School of Hospital Administration which guides students to "research and discuss how culture, geography, history, society, and politics affects, and is affected by, cuisine" was coded as: "culinary," "political science," "history," "sociology," and "geography." Syllabi which employed only one discipline in their course descriptions or learning outcomes were excluded from the sample *unless* another section of the syllabus involved explicit references to other disciplines employed.

6.3 Equity content

The syllabi engaged with equity-related content to varying degrees. We chose a three-level grading schema to reflect the levels of engagement with equity: no equity-related content, limited equity-related content (Level 1, or "L1"), and deeply equity-centered content (Level 2, or "L2"). Excerpts coded as L1 Equity Content acknowledge and describe inequities but do not explore the systemic causes of those inequities nor solutions to address those causes at their root. They discuss topics including food security, global poverty, animal welfare, disparities, (in)equality, (in)equity, (in)justice, globalization, industrialization, socioeconomic class, income, or livelihood. Valley et al. (2020) employs an analogous three-level framework for grading the degree of equity content in sustainable food systems education materials. Their framework characterizes courses that engage with equity to a limited degree as focusing "on more abstract and generic concepts of sustainability such as integrating social, economic, and environmental concerns; an appreciation for diversity of cultures, perspectives, and preferences; ethics and civic engagement; and interventions that focus on universal outcomes related to education, community, and/or food systems. Often, these equality statements lacked descriptive elements that identified how a universal approach would address systemic issues facing specific social groups who are most impacted" (p.5).

By contrast, excerpts coded as L2 Equity Content explore the root causes of inequity and their potential solutions. They explicitly discuss topics such as race, gender, sexual orientation, Indigeneity, ability, labor, food justice, food sovereignty, migration, White supremacy, colonialism, neoliberalism, capitalism, violence, transformation, and social movements. Valley et al. (2020) similarly characterizes such courses as those that engage with "institutional or systemic forms of oppression and marginalization based on gender, race, class/socio-economic, ethnicity; food justice and/or food sovereignty; unequal power relations; and developing attitudes and motivations toward personal action in addressing inequity" (p. 5). The excerpts were analyzed for several specific topics. A given "Topic Included" was coded when the following keywords were used. Each excerpt was checked to ensure each keyword was used in the intended context (e.g., that the keyword "*rac-*" did not erroneously capture words such as "running race," beyond the intended topic of "race"):

- Race: *rac-, White supremacy*
- Gender: *gender, patriarch-*
- Class: *class-, poverty (referring to the US), income, capitalis-*
- Colonization or Indigeneity: *coloni-, Indig-, native*
- Oppression: *oppress-*
- Power: *power*
- Justice: *just-, right-*
- Social Movements: *movement, right-*

By definition, all of the "Topics Included" were found only in excerpts coded as L2 Equity Content, except for "Justice," found among both L1 and L2 excerpts. We selected these topics inductively by reviewing the academic literature and the syllabi, and identified them as important, though certainly non-comprehensive, concepts for FSE.

6.4 Equity-centered pedagogical practices

To develop a list of Equity-Centered Pedagogical Practices, we drew from a range of pedagogical research from food justice

TABLE 2 Equity-centered pedagogical practices.

Strategy	Explanatory or definitional quote	Connections to literature
Assessing positionality	"A key concept is positionality, the understanding that our life experiences and practices are deeply entangled with the ways we see the world" (Alkon and Agyeman, 2011, p. *xi*)	1, 2, 4, 5, 6, 7, 8, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19
Celebrating diversity and differences	"To commit ourselves to the work of transforming the academy so that it will be a place where cultural diversity informs every aspect of our learning, we must embrace struggle and sacrifice. We cannot be easily discouraged. We cannot despair when there is conflict. Our solidarity must be affirmed by shared belief in a spirit of intellectual openness that celebrates diversity, welcomes dissent, and rejoices in collective dedication to truth." (Hooks, 1994, p. 33)	1, 2, 3, 4, 5, 6, 7, 8, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19
Contesting systems of oppression	"Universities and colleges are not only institutions which provide sustainable food systems education that students then carry out into the world. Campuses are also fertile places for engaging in action-based education—that is, learning from experience in practicing social change—as they are physical and socio-cultural sites that reproduce larger food system problems" (Fanshel and Iles, 2022, p. 1)	1, 2, 3, 4, 5, 6, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18
Dialogic learning	"Through dialogue, the teacher-of-the-students and the students-of-the-teacher cease to exist and a new term emerges: teacher-student with students-teachers. The teacher is no longer merely the-one-who-teaches, but one who is himself taught in dialogue with the students, who in turn while being taught also teach. They become jointly responsible for a process in which all grow" (Freire, 1968/2000, p.80)	1, 2, 3, 4, 5, 6, 8, 9, 10, 11, 12, 13, 15, 16, 17, 18, 19
Intersectional thinking	"How social differentiation occurs through interactions between 'markers of difference' (for example, social identities formed by gender, race, and class)" (University of British Columbia, 2020, n.p.)	1, 2, 3, 5, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19
Valuing lived experience	"The concept of Ukweli, refers to the groundedness of educational processes and practices in the experiences of the learner in a particular school community being served… In other words, the standards for establishing the educational needs of the learners, and the individuals in that inclusive classroom community, must be determined by the real life experiences of the learners and educators… It is very important to establish that one cannot ignore the real life and historical experiences of educators and learners" (van Wyk, 2014, p.2)	1, 2, 4, 5, 6, 7, 8, 9, 10, 13, 14, 15, 16, 17, 18, 19
Acknowledging traditional ecological knowledge	"A substantive body of knowledge that is created and stored by human societies to aid in their flourishing in the face of environmental and natural resources challenges. The time scale of this knowledge is many generations. In this sense, TEK is taken as archival in nature. It is a store of knowledge of the relationships between living things and their environment" (Whyte, 2013, p.3)	1, 3, 8, 9, 10, 11, 12, 13, 14, 15, 17, 19

Food systems pedagogy literature: 1. Aguilar, 2021; 2. Burdick, 2014; 3. Carlisle et al., 2019; 4. Ebel et al., 2020; 5. Fanshel and Iles, 2022; 6. Galt et al., 2013a; 7. Guthman, 2008; 8. Jones, 2019; 9. Meek and Tarlau, 2015; 10. Sterling et al., 2021; 11. University of British Columbia, 2020; 12. Valley et al., 2018; 13. Valley et al., 2020; 14. Williams-Forson and Cognard-Black, 2014. Critical pedagogy literature from other fields: 15. Blakeney, 2005; 16. Kishimoto, 2018; 17. Polk and Diver, 2020; 18. White, 2003; 19. van Wyk, 2014.

literature, as well as from environmental justice, critical race, feminist, Indigenous, Afrocentric, Freirian, and other frameworks. Table 2 provides a definitional quote from the seminal literature, and links each of our chosen equity-centered pedagogical practices to literature references. L2 Practices engage more deeply with equity-centered pedagogy than L1 Practices. This schema is by no means comprehensive, and represents just one adaptable, albeit necessarily incomplete, means of categorizing critical pedagogy strategies. Such strategies are also not static, and for most effective use should evolve over time and be iteratively adapted to suit the context of the instructor and students and the classroom environment.

6.5 Training for action

All references to course components that involve students taking action in food systems were coded as "Training for Action." The five areas identified arose organically as the activities most commonly noted in the syllabi: "Community Engagement" (e.g., participating in a work day at a local urban farm), "Career Planning" (e.g., job-oriented mentorship and guest speakers, resume preparation, and introductions to potential employers through field trips and career fairs), "Farming, Gardening, and Culinary Skills" (e.g., students' developing their own farm plot and harvest schedule), "Impacting Policy" (e.g., preparing

policy memos, contacting policymakers, and collaborating with advocacy groups on a policy campaign), and "Participating in Social Movements" (e.g., helping a grassroots food justice organization design a public education program for local youth).

7 Results

7.1 Syllabi

Among the 21 universities who were contacted, professors at 20 of the universities provided syllabi. There were 1,820 "food" courses identified among the 21 universities; these constituted *List 1: Food Courses* (Figure 1). *List 2: FSE Courses* included 525 courses (29% of *List 1*). Among the 525 courses in *List 2*, professors provided 165 syllabi and 6 syllabi were obtained online. These 171 syllabi (33% of *List 2*) constituted *List 3: FSE Syllabi Obtained* (Table 3). There were an average of 8 FSE courses (standard deviation (SD) = 4) offered at each of the 21 MCURC LGUs. All the syllabi obtained were taught during the 2022–2023 school year and were available to undergraduates. Fourteen syllabi lacked learning outcomes and three lacked course descriptions; in these cases, other syllabus content was assessed, such as the module topics, course activities, and readings. Among a random sample of 10% of the syllabi, the average number of sentences of the course description was 5.7 sentences (161 words), and the average number of learning outcomes was 3.6 (73 words).

7.2 Multidimensional approaches

Most syllabi (51%) effectively employed multidimensional approaches (Table 4), incorporating all three dimensions of Environment, Society and Culture, and Health. Almost all syllabi explored Society and Culture (96%). Many also explored the Environment (75%), while fewer explored Health (68%).

7.3 Interdisciplinarity

The departments in which courses were most commonly listed were highly varied (Table 4). Fifty-nine percent of the courses were

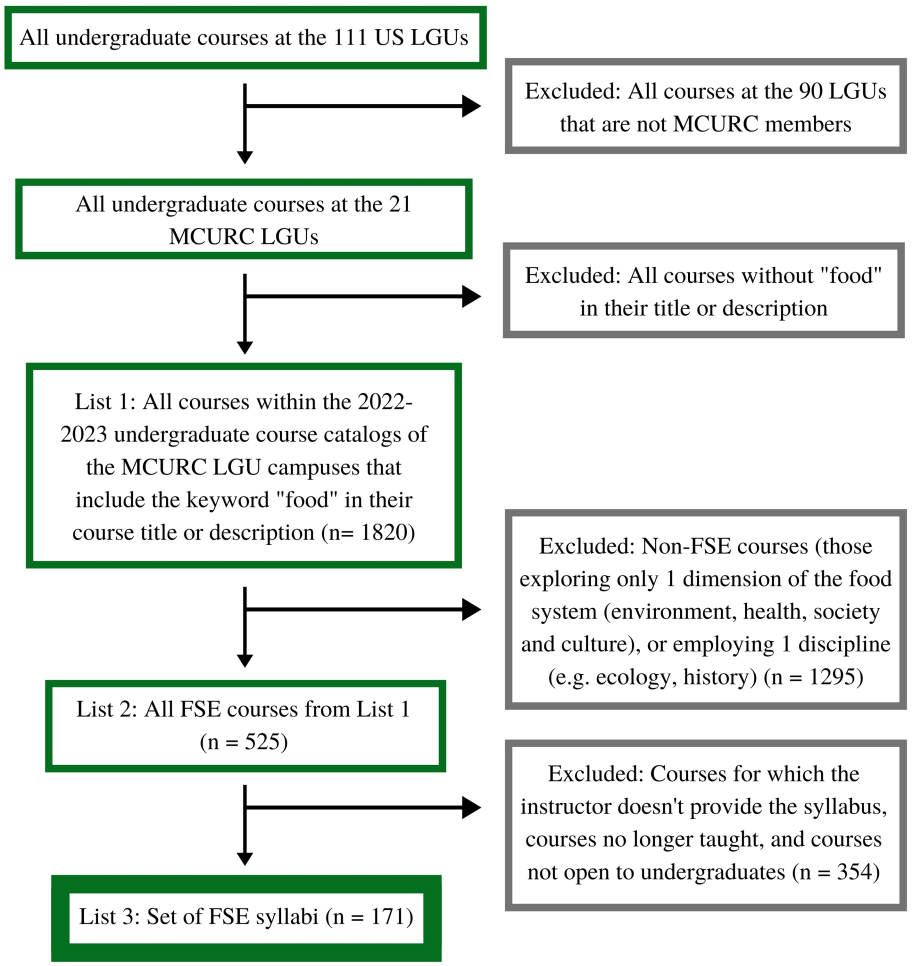

FIGURE 1
Syllabus selection process. Among all the courses offered at the 21 MCURC LGUs, only those available to undergraduates, taught in 2022–2023, fitting the definition of FSE, and those for which a syllabus was obtained were included for analysis ($n = 171$).

listed under the departments of Agriculture/Crop Science, Nutrition, Environmental Studies/Science, Sociology, or Economics, while the remaining 41% were listed under 26 other departments. Eighteen percent of the courses were cross-listed under two, three, or four different departments. Many syllabi (45%) employed (e.g., explicitly referenced by name or described teaching methods specific to) over six disciplines in their course descriptions and learning outcomes (Table 4). This broad application of diverse disciplines in food systems courses, and the hosting of such courses in diverse departments, reflects robust interdisciplinarity in FSE. Several of the disciplines necessary for understanding food systems were moderately well-represented, such as economics and political science (Table 5). However, other essential disciplines were underrepresented. Only about half of syllabi employed the disciplines of sociology, history, environmental studies, nutrition, or anthropology. The inclusion of natural sciences of ecology and biology was very limited, as were hands-on disciplines such as agroecology, horticulture, and culinary. Humanities such as philosophy, religion, art, and writing and literature were almost entirely absent.

7.4 Equity content

Over one quarter of the syllabi (29%) did not discuss any topics related to equity (Table 6). In other words, the course descriptions and learning outcomes of these course syllabi did not include any discussion of topics including food security, global poverty, disparities, (in)equality, (in)equity, injustice, socioeconomic class, income, livelihoods, etc. Nearly one-third (31%) engaged in a more limited exploration (L1) of equity topics, but failed to explicitly discuss (L2) issues of race, gender, colonization, oppression, etc. Forty percent of syllabi engaged with L2 Equity Content. The universities with the greatest percentage of courses with syllabi that employed any L1 or L2 Equity Content were Virginia Tech (100%), UC Santa Barbara (100%), UC San Diego (100%), University of Massachusetts, Amherst (91%), North Carolina State University (88%), and UC Los Angeles (88%). The universities with the lowest percent of courses with syllabi that employed any L1 or L2 Equity Content were Rutgers University (50%), Pennsylvania State University (44%), University of New Hampshire (40%), and UC Davis (40%).

7.5 Equity-centered pedagogical practices

L1 Equity-Centered Pedagogical Practices aim to increase students' ability to synthesize, apply, and communicate information, think critically, and work with others within and beyond the classroom. They represent foundational academic, professional, and personal capacities students need to succeed in the classroom and world. Almost all syllabi applied L1 practices (Table 7). While over half of syllabi employed the practices of critical thinking, comparing different contexts, and effective communication, fewer syllabi employed such important practices as experiential learning (33%), teamwork (25%), and developing leadership skills (19%) (Table 8). L2 Equity-Centered Pedagogical Practices more deeply aim to develop student's ability to help contribute to the creation of a classroom community that fosters horizontal, dialogic learning; a critical assessment of power, privilege, and positionality; and values different ways of knowing. 42% of syllabi employed L2 Practices (Table 7). The most commonly employed L2 practice, valuing lived experience, was only employed in 19% of syllabi. Other key L2 practices were even less present, such as contesting systems of oppression (12%), assessing positionality (11%), and acknowledging traditional ecological knowledge (5%) (Table 8). The universities with the greatest percentage of courses with syllabi that employed any L2 Practices (only 3 courses failed to employ any L1 Practices) were University of Connecticut (67%), UC Berkeley (67%), UC Los Angeles (63%), and Virginia Tech (57%). The universities with the lowest percent of courses with syllabi that employed any L2 practices were University of New Hampshire (20%), Kansas State University (20%), Pennsylvania State University (12%), Michigan State (0%), and University of Maryland (0%).

7.6 Training for action

Only a small portion of syllabus course descriptions and learning outcomes mentioned course goals, outcomes, or assignments involving any action-based activities (Table 9). Notably, the activities most associated with social change (community engagement, impacting policy, and participation in social movements) were implemented less frequently than career planning, which is frequently (but not always) more associated with activities that do not challenge, but rather uphold, the food systems status quo.

8 Discussion

FSE in the United States has undergone impressive growth since the early 2000s (Salvador et al., 1995; Lieblein et al., 1999; Karsten and Risius, 2004; Parr and Van Horn, 2006). The growth of FSE was accelerated by the contributions of many FSE instructors who have innovated and disseminated effective strategies for creating and institutionalizing FSE on university campuses (Karsten and Risius, 2004; Parr and Van Horn, 2006; Jacobsen et al., 2012). Our results demonstrate the robust presence and breadth of FSE at LGUs. The response rate (33% of all course syllabi requested were obtained) indicates that many instructors are open to sharing resources to expand the knowledge base of different FSE approaches. Now that many universities have successfully established FSE, many institutions and instructors (such as those contributing to and using the Sustainable Food Systems Education (Valley et al., 2018) and Critical Food Systems Education frameworks (Meek and Tarlau, 2016)) are moving to the next challenge: how can instructors deepen the effectiveness, relevancy, and impact of FSE?

Many FSE syllabi employed multidimensional approaches by incorporating all three dimensions of environment, health, and society and culture. This finding provides encouraging evidence of the progress made since Salvador et al. pointed to a lack of multidimensional approaches in FSE (Salvador et al., 1995). It corroborates the assessment by Meek and Tarlau (2016) that multidimensional approaches have indeed been more effectively taught in FSE classrooms within the past decade (while other capacities, however, remain less developed). Almost all syllabi discussed society and culture, while slightly fewer discussed the environment, and fewer discussed health. This reflects that FSE instructors are not discussing topics of health or the environment in artificial silos, divorced from society. Acknowledging the

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TABLE 3 Number of syllabi analyzed.

Region	University	# of Food courses (List #1)	# of FSE courses (List #2)	# of FSE syllabi analyzed (List #3)	Response rate among List 2 courses (List 3/List 2)
Midwest	Kansas State University	183*	27	5	19%
	Michigan State University	136	28	7	25%
	The Ohio State University	42	17	9	53%
Northeast	University of Connecticut	28**	9	6	67%
	University of Massachusetts, Amherst	67	32	11	34%
	University of New Hampshire	14	9	5	56%
	Rutgers University	69	35	8	23%
	Cornell University	246*	59	19	32%
	Pennsylvania State University	96*	37	9	24%
	University of Vermont	40**	29	15	52%
South	University of Maryland	59	23	12	52%
	North Carolina State University	91**	29	8	28%
	Virginia Tech	152*	33	7	21%
West	University of California (UC) Berkeley	82	16	12	75%
	UC Davis	91	23	5	22%
	UC Los Angeles	40	29	8	28%
	UC San Diego	27	12	2	17%
	UC Riverside	32	9	0	0%
	UC Santa Barbara	53*	21	7	33%
	Colorado State University	165**	17	8	47%
	Oregon State University	107	31	8	26%
	TOTAL	1820	525	171	33%

*This university course catalog did not distinguish between nor enable filtering of undergraduate from graduate courses, so List #1 includes both types, and is thus larger. Graduate courses were filtered out within List #2. **This university course catalog did not explicitly distinguish which year the catalog was from, so it was assumed to be the most recent year. In emailing with instructors, CH affirmed which classes were still being taught and excluded those that were not.

interconnections of society with the environmental and health-related aspects of our food system is an important step toward interrogating how justice and social change interact with food.

FSE courses were taught across a range of 31 departments. The broad span of departmental hosts within and across universities reflects the breadth of disciplinary expertise that today's FSE students can learn from. Spreading FSE across numerous departments may also expand the reach of these courses to students who would not have otherwise taken a food-related course. Cross-listing courses across different departments also increases interdisciplinarity. Many syllabi explicitly discussed the value of interdisciplinarity to their teaching strategy. The broad department hosts, cross-listing, and incorporation of multiple disciplines into a single course represents progress toward interdisciplinarity.

Despite this breadth, the departments that hosted the most FSE courses tended to be those associated with more conservative, neoliberal teaching philosophies. This trend most likely contributed to the underrepresentation of equity-centered topics and practices. Nineteen percent of FSE courses were located within Agriculture/Crop Sciences departments (or 25% if one adds the departments of "Food Science" and "Animal Science," which we counted separately). University agriculture departments are reported to be more conservative. Martin and Hartmann (2020) observe ways in which some agriculture students center Whiteness and perpetuate racism and homophobia. Archibeque-Engle (2015) describes the institutionalized exclusion of female and racially minoritized students in the Departments of Animal Sciences at three US LGUs. Martin et al. (2019, p. 1) explains, "Agriculture curriculum can become a form of whiteness if left unexamined. Because agriculture has been dominated by white men through most of history, the curriculum of agricultural studies has also historically been dominated by white men". Conservatism and hegemonic perspectives within agriculture

TABLE 4 Multidimensional approaches and interdisciplinarity in syllabi ($n = 171$).

Pedagogical aspect	Outcome	Number (%)
Number of food systems dimensions	3	88 (51%)
	2	64 (37%)
	1	17 (10%)
	0	2 (1%)
Which food system dimensions are explored?	Society and Culture	164 (96%)
	Environment	129 (75%)
	Health	116 (68%)
Under which departments are courses listed?*	Agriculture/Crop Science	33 (19%)
	Nutrition	23 (13%)
	Environmental Studies	19 (11%)
	Sociology	15 (9%)
	Economics	12 (7%)
Number of cross-listings	2	26 (15%)
	3	3 (2%)
	4	1 (1%)
How many different disciplines do syllabi employ at least once?	1	7 (4%)
	2–3	28 (16%)
	4–5	59 (35%)
	6–8	61 (36%)
	9–12+	15 (9%)

*Beyond the top 5 departments, the remaining courses were listed under Anthropology (6%), Food Systems/Studies (5%), Food Science (5%), Horticulture (4%), Political Science (4%), Global Development (4%), History (3%), Agroecology/Sustainable Agriculture (2%), Italian (2%), Hospitality Administration (2%), Philosophy (2%), Health Studies (2%), Introductory Seminar (2%), Education (2%), Performance/Media Arts (2%), Writing/Journalism/Communication (1%), Comparative Studies (1%), Religious Studies (1%), Native American Studies (<1%), Labor Studies (1%), Asian Studies (<1%), Social Work (<1%), Animal Science (<1%), Biology (<1%), Geography (<1%), and Science, Technology, and Society (<1%).

departments may help explain the limited incorporation of equity content and practices in FSE. The second most common department to host FSE was Nutrition. While new approaches to equity-centered nutrition pedagogy are emerging within and beyond LGUs, LGU Nutrition departments have historically played a large role in upholding the "predominant food pedagogies [that] perpetuate racialized assumptions about food and health" (Jones, 2023, p.1). Nutrition education that assigns full dietary responsibility to individual behavior while invisibilizing the roles that food and beverage marketing, corporate lobbying, political and economic incentives, unjust housing and transportation policies, systemic racism, and poverty play in diet-related health outcomes reflects a conservative, neoliberal teaching philosophy. Furthermore, the fifth most common departmental host (behind Agriculture/Crop Sciences, Nutrition, Environmental Studies, and Sociology) was Economics, which is reported to lean conservative. One 2005 national survey found that 55% of economics professors considered themselves liberals versus 72% of all faculty. Thirty-nine percent considered themselves conservative, compared to 15% of all faculty (Rothman et al., 2005). The survey found that, behind Business, Engineering, and Nursing, Economics was the most conservative department. Kelinsky-Jones et al. (2023) analyzed a focus group discussion on the topic of agroecology among a group of university faculty leading USAID-funded development labs at US land-grant universities. Nine of the fourteen interviewees identified as economists, and several stated that their disciplinary training offered barriers to appraising the value of agroecology and food sovereignty initiatives. The predominance of departmental listings in Agriculture/Crop Science, Nutrition, and Economics may contribute to the limited use of equity-centered topics and practices. Crucially, not all courses taught in these departments are conservative; several syllabi in these departments stood out with bold distinction in exemplifying critical praxis. However, most course syllabi conformed to these departmental trends.

While the underrepresentation of humanities departments (as compared to social science and agricultural science departments) was to be expected, the extent of their absence vastly reduces the interdisciplinarity of FSE. Minimizing the humanities also marginalizes ways of thinking, knowing, learning, and creating which lay beyond the technical sciences and social sciences. Progress toward implementing equity-oriented course content is also severely limited by the lack of courses hosted in ethnic studies departments (e.g., Native American Studies, Asian Studies, Comparative Studies, etc.). Furthermore, the limited number of courses under Food Systems/Studies, Horticulture, and Agroecology/Sustainable Agriculture departments (11% altogether) circumscribes opportunities for students interested in exploring on-site food systems praxis, including land-based education informed by Indigenous pedagogy.

The analysis of disciplines employed in FSE courses reveal that courses fail to expose students to perspectives necessary for developing an equity-centered understanding of food systems, including sociology, anthropology, history, the environment, and nutrition. Business and marketing (while an important part of understanding numerous food systems aspects) is employed about as frequently as ecology and biology, and more than twice as frequently as horticulture or agroecology. Humanities disciplines are almost absent from most FSE courses, depriving students of crucial frames of inquiry and ideation.

Most courses did not focus on equity. The high number of syllabi that included no mention of Equity Content (neither L1 nor L2) is particularly concerning given that 96% of syllabi did discuss society and culture. This implies that some courses in that group failed to discuss how the social dimensions of food involve a degree of inequity. A crucial step toward centering equity in FSE is ensuring that all syllabi acknowledge both a connection of food systems to society, as well as to social inequities. Only a small portion of syllabi mentioned race, class, gender, colonization, or Indigeneity. This corroborates many scholars' call for a need to deepen all syllabi's engagement with deeper equity topics (Burdick, 2014; Meek and Tarlau, 2015; Valley et al., 2018; Valley et al., 2020; Aguilar, 2021; Fanshel and Iles, 2022). We note that this is one area on which this study's data—syllabi—may fail to capture the content of the course. Instructors teaching courses deeply engaged with L2 Equity Content may nonetheless intentionally exclude those topics in their syllabi in order to make the class more introductory and approachable to a wider range of students during the enrollment period. Strategically aiming to reach students who are not yet deeply exposed to critical

TABLE 5 Number of syllabi employing disciplines and number of instances employed.

Disciplines	# of syllabi employing discipline (n = 171)	# of excerpts employing discipline
Economics	106 (62%)	215
Political science	98 (57%)	270
Sociology	91 (53%)	242
History	90 (53%)	210
Environmental studies	84 (49%)	280
Nutrition	82 (48%)	298
Anthropology	78 (46%)	239
Business and marketing	34 (20%)	102
Ecology	34 (20%)	62
Biology	31 (18%)	51
Culinary	22 (13%)	80
Engineering	22 (13%)	31
Geography	21 (12%)	32
Psychology	19 (11%)	46
Philosophy	18 (11%)	46
Agroecology	14 (8%)	37
Horticulture	13 (8%)	48
Religion	11 (6%)	18
Data Science	8 (5%)	13
Art	6 (4%)	10
Education	6 (4%)	28
Writing and literature	6 (4%)	15
Political Ecology	3 (2%)	4
Civic, urban, and alternative agriculture	2 (1%)	5

TABLE 6 Equity content in syllabi (n = 171).

Level of equity content	Number (%)
No equity content	50 (29%)
L1 equity content only	53 (31%)
L2 equity content	68 (40%)
Topics included	**Number (%)**
Justice	48 (28%)
Race	32 (19%)
Socioeconomic class	27 (16%)
Social movements	27 (16%)
Gender	18 (11%)
Colonization or Indigeneity	16 (9%)
Power	14 (8%)
Oppression	7 (4%)

TABLE 7 Equity-centered pedagogical practices in syllabi (n = 171).

Level of equity-centered practices	Number (%)
No equity-centered practices	3 (2%)
L1 Equity-centered practices only	96 (56%)
L2 Equity-centered practices	72 (42%)

social inquiry, instructors may develop syllabus course descriptions and learning outcomes with more vague language. Furthermore, some universities in states with legislation against teaching race-related content in higher education may include written or unwritten policies to prevent instructors from including such content in their syllabi (Ray and Gibbons, 2021). Instructors may opt to remove that content from syllabi and deliver it mainly through class. Nonetheless, while these and other reasons may prevent some instructors from including Equity Content in their syllabi, it is likely that most syllabi did not include such content because the courses did not explore them deeply.

Almost all courses employed L1 Equity-Centered Practices. The top four most commonly employed practices (critical thinking, comparing different contexts, effective communication, and applying class topics to the real world) align with core competencies identified as necessary for graduates to enter and excel in the food systems workforce (Carlisle et al., 2019; Ingram et al., 2020; Nordstrom et al., 2022). For decades, LGU pedagogical scholars have emphasized the importance of such competencies, and it is evident that LGU administrations and instructors have mobilized to implement them. Crucially, these skills also set the stage for deeper engagement with social justice and action beyond the classroom. However, they by themselves may not always catalyze students' launch into transformative food systems change. Almost all syllabi employed at least L1 equity-centered practices, yet only 19% explored the topics of race, 16% explored class, 11% gender, and 9% colonization or Indigeneity. Therefore, many courses neglected to or avoided connecting pedagogical tools such as L1 Practices with social justice topics. L1 Practices provide scaffolding toward the L2 Practices defined in Table 2, which serve as indispensable tools to help students understand and address injustice in food systems and society at large. Modeling these practices allows instructors to shape a more inclusive, equitable, trusting classroom community, facilitating the hard work of exploring equity and social justice topics (Polk and Diver, 2020; Chew et al., 2020). Only a minority of syllabi employed L2 Practices.

Finally, few syllabi discussed specific course content or strategies that involved taking action in food systems. Despite robust literature on the urgent need to pair equity-centered, critical "reflection" with "action" to engage students in praxis (Freire, 1968/2000; Hooks, 1994; Ford and Airhihenbuwa, 2010; Jones, 2023), very few syllabi provided students with opportunities for action. Furthermore, many of the action-based activities described in syllabi represented pathways toward upholding, rather than transforming, the existing food system. We used a broad criteria to define Training for Action; not all excerpts coded as such represented the "action" component of praxis, as not all hands-on, experiential activities in FSE courses are praxis. Career preparation, culinary workshops, and garden workdays that fail to acknowledge and grapple with social issues are unlikely to

prepare students to challenge unjust and unsustainable food systems. We did not identify the extent to which each Training for Action excerpt aligned with praxis. Still, even when applying this broader criteria, only a small portion of syllabus course descriptions and learning outcomes mentioned course goals, outcomes, or activities involving action-based activities. While the most well-represented category, career planning, can in many instances serve as praxis (such as described by Carlisle et al., 2019 and Nordstrom et al., 2022), in other instances it merely prepares students to participate in the food systems status quo. Furthermore, as Anyon (1980) describes in the seminal article "Social Class and the Hidden Curriculum of Work," instructors employing explicit or implicit classroom strategies aimed at student career preparation can serve to reproduce social inequities by preparing students to occupy roles associated with their current social class. This form of career-oriented teaching, a cornerstone of neoliberal education, limits, rather than empowers, students' potential to transform themselves and social systems. The Training for Action activities that were more likely to be considered praxis were poorly represented, such as working alongside grassroots organizations to support a food justice campaign, learning traditional ecological knowledge practices via a workshop with Indigenous educators, or power mapping. This represents a critical missed opportunity: food is a tangible learning tool, as can be food systems action. Campus food spaces, including dining halls, farms, gardens, student-accessible kitchens, waste-sorting facilities, religious and spiritual spaces, protest sites, and so many more, offer ripe opportunities for the "action" component of praxis (Classens and Sytsma, 2020; Fanshel and Iles, 2022).

TABLE 8 Examples and prevalence of equity-centered pedagogical practices ($n = 171$).

Pedagogical practice		Excerpt from syllabus	Number (%)
Level 1	Critical thinking	To learn about and critically evaluate grassroots, regional and federal policy and planning efforts to improve equity in our food systems — University of Massachusetts Stockbridge School of Agriculture course	143 (84%)
	Comparing different contexts	We then engage in a broad review of the scientific literature on a range of both incremental and transformative approaches to improving the sustainability of these systems, paying close attention to both environmental, social and economic outcomes. — The Ohio State University Environment and Natural Resources course	110 (64%)
	Effective communication	Students are expected to synthesize and integrate knowledge acquired in previous courses and other learning experiences and to apply this in a professional project contributing to a product, presentation, and experience that they can highlight on their resume and presentation. — North Carolina State University Horticultural Science course	90 (53%)
	Applying class topics to the real world	The … Fellowship and the … Lab form a contextual space for grounding course themes in practical terms, and invited speakers will anchor class discussions in real-world applications. — Cornell University Global Development course	82 (48%)
	Using diverse information sources	Watch and listen to films, documentaries, video clips, and audio recordings that examine the sociological implications of class, gender, race/ethnicity/nationality, and geography in the food system. — Colorado State University Sociology course	81 (47%)
	Experiential learning	Become familiar with mastic, a culturally significant ingredient, including its cultivation, bioactive ingredients, and health benefits through a tour and tasting at a mastic farm and production facility. — UC Berkeley Nutritional Sciences and Toxicology course	57 (33%)
	Teamwork	Like a CSA we will have to produce their required produce on a twice per week basis. — University of New Hampshire Sustainable Agriculture and Food Systems course	42 (25%)
	Considering life cycle impacts	Students will gain an understanding of the relationships between the activities of the food system (production, processing, distribution and transport, food safety) and the outcomes of the food system (health, environment, hunger, food security, culture, economics, and policy). — Kansas State University Horticulture course	39 (23%)
	Assessing the impact of individual choices	The basic perspective of the course is that the 'personal is political', meaning that what you eat is a political act in that it both results from and maintains larger social (race / class / gender / religion / ethics), political (laws / policies) and economic (social class / inequality) forces. — University of Connecticut Sociology course	38 (22%)
	Developing leadership skills	Develop, implement and evaluate a feasible model, strategy, or policy to promote a sustainable food system with a community partner — Virginia Tech Agriculture and Life Sciences course	33 (19%)
	Navigating difficult situations	I hope you get a little uncomfortable this semester and that I get a little uncomfortable too. — University of Vermont Nutrition and Food Sciences course	23 (13%)

(Continued)

TABLE 8 (Continued)

Pedagogical practice		Excerpt from syllabus	Number (%)
Level 2	Valuing lived experience	I will ask you to explore and interrogate your own perspectives and values in conversation with those introduced in the course materials. — University of Vermont Community Development and Applied Economics course	32 (19%)
	Intersectional thinking	We therefore begin the course with a structural analysis of the major inequalities people experience in their relationship to food, paying close attention to the ideological and material drivers of capitalism, colonialism, patriarchy, institutional racism, and white supremacy. — Colorado State Sociology course	27 (16%)
	Dialogic learning	I value you and all that you bring to the course. This is a learning community built upon reciprocity and horizontal learning. Open your heart and mind and we'll have an exciting journey as we explore, build and share knowledge and experience. — University of Vermont Plant and Soil Science course	26 (15%)
	Celebrating diversity and differences	We will spend some (virtual) time with an author who has written a novel on 'cue, and we will also try to coordinate a visit, outside of class, to at least one, if not two regional joints, where we can speak with owners and pit-masters, customers and devotees, about their business models, their culinary decisions, and their traditions – yes, we will taste, but we will also learn, and use what we have learned, to understand the world of foodways and food culture and its intersections in our lives. — Rutgers University First-Year Seminar course	24 (14%)
	Contesting systems of oppression	Key objectives include identifying antiracist revenue models, management and governance practices, and organizational values that emphasize collaboration rather than competition. — Cornell University Applied Economics and Management course	20 (12%)
	Assessing positionality	Apply the theory of positionality to a personal Food Blog (includes food poems and reading analysis…etc) that aims to heal our cultural disconnection from ourselves – our bodies / each other / our food / the planet. — University of Connecticut Sociology course	18 (11%)
	Acknowledging traditional ecological knowledge	We examine traditional ecological knowledge in farming systems around the world asking the question: what makes these systems adapted and sustainable to their local environment? — UC San Diego Anthropology course	9 (5%)

8.1 Strengths and limitations

This study has several strengths. It is likely one of the first studies to access and analyze a large number of course syllabi as a means to investigate the current state of FSE. It uses a broad range of pedagogical frameworks within and beyond the realm of food systems to construct a qualitative codebook for assessing equity-centered, action-oriented pedagogical strategies. It highlights syllabus excerpts exemplifying numerous teaching practices. It discusses potential causes for the trends observed among syllabi and (below) identifies five specific recommendations for instructors. Additionally, a public website[1] has been created, featuring the course syllabi for which we obtained instructors' consent to post syllabi publicly (over 60 syllabi at the time of publication). We also launched an email list among food systems instructors interested in continuing to exchange resources, opportunities, and ideas on food systems pedagogy.

This study also has limitations. First, the sample of higher education institutions is not a representative sample of all US higher education institutions, of all MCURC universities, nor of all LGUs. The study uniquely explored FSE taught at LGUs that are members of the MCURC. Thus, the sample of schools is not randomized. At the time of publication, the MCURC does not yet include any historically Black colleges and universities (HBCUs) nor tribal colleges and universities (TCUs), though there are 19 and 35 within the LGU system, respectively. This is because, until 2022, MCURC membership required that universities have self-operated dining operations, whereas many HBCUs and TCUs employ food service contractors. The MCURC has revised this eligibility requirement with the explicit goal of expanding equity and representation, and is actively reaching out to, holding conversations with, and welcoming membership from a variety of HBCUs; working to engage TCUs; and expanding the overall proportion of membership from minority-serving institutions. While our sample is not representative of all LGUs, we chose to focus on MCURC LGUs to facilitate the dissemination of our findings. Many of the authors are actively connected to and will share our results throughout the MCURC, a network including many instructors receptive to implementing this study's recommendations. Second, all six of the University of California campuses in the MCURC were included in the study. However, while the whole UC system is a land-grant institution, only UC Berkeley, UC Davis, and UC Riverside have agricultural extension programs. The additional three campuses were included, despite being non-extension LGUs, due to their status as part of the UC system, and because of their funding, administrative, and pedagogical ties to the agricultural resources and research of the UC system. Another related limitation is the relatively large representation of California universities in the study. Third, the method of selecting which "food" courses (in *List #1*) were "food systems education" courses [according to the criteria of including more than one food systems dimension (e.g., environment, society and

1 https://sites.google.com/view/food-systems-ed

TABLE 9 Examples and prevalence of training for action ($n = 171$).

Training for action practices	Excerpt from syllabus	Number (%)
Career planning	The final team project is intended to help you learn about the work organizations (non-profits, companies, coalitions, government agencies…) are doing to help make a transition to an agroecological future, and what sorts of careers are available in this broad field. — UC Berkeley Department of Environmental Science, Policy, and Management course	34 (20%)
Community engagement	Students will build upon [a local oral history initiative] as a community-based research project that illustrates the lived experiences of organizers and change agents addressing health equity, community resiliency, agrarian sustainability, and environmental justice in their communities. — Virginia Tech Department of Agricultural, Leadership, and Community Education	33 (19%)
Farming, gardening, and culinary skills	Through hands-on field exercises in local farming systems, students learn practical, ecological and social research and analytical skills, which are commonly used in agroecology and agrifood systems research — University of Vermont Plant and Soil Sciences course	25 (15%)
Impacting policy	Students in this course are preparing for a wide variety of policy-related professions in government, nonprofits, and the business world. — Oregon State University Public Policy course	22 (13%)
Participation in social movement	Contributing to grassroots movements and organizations fighting for food sovereignty and/or curating materials that help others learn about these issues – UC Davis Native American Studies course	15 (9%)

culture, and health) and more than one discipline (e.g., ecology, policy, economics, engineering)] in *List #2* revealed several courses in the gray area. The criteria applied in these cases was more inclusive rather than exclusive. Fourth, while every attempt was made to document all FSE courses, some may have been missed. Fifth, syllabi (and specifically, their course descriptions and learning outcomes) convey only a fraction of the breadth of topics and pedagogical practices employed in a course. Furthermore, courses may evolve and adapt more rapidly than reflected in syllabi. Many universities instate time-consuming, bureaucratic syllabus approval processes, disincentivizing instructors from updating syllabi, even if their course content and pedagogical practices have evolved. Surveying and interviewing course instructors, as well as their students, would provide a fuller picture of the extent to which the teaching tools discussed in this analysis were truly employed.

8.2 Recommendations for advancing transformative praxis through FSE

Transforming higher education FSE represents one step toward shifting food systems toward greater justice, health, and sustainability. Below, we draw upon the study's syllabi and other FSE resources to propose recommendations for FSE instructors. We explicitly include references to existing programs underway at the MCURC LGUs in our sample because, by aligning with efforts already underway on their own campuses, instructors may find greater guidance, partnership, and institutional support.

We recommend that FSE instructors striving to deepen their course engagement with equity and action can:

8.2.1 Use critical pedagogy resources to reflect on their teaching

Instructors should explore literature, attend trainings and workshops, and discuss with peers and mentors regarding strategies for critical, equity-centered, action-oriented, trauma-informed, antiracist pedagogy. We recommend exploring the:

1 Reference list in Table 2.
2 University of British Columbia's Faculty of Land and Food Systems "Just Food" website.[2]
3 UC Berkeley's Department of Environmental Science, Policy, and Management's (ESPM) "Advancing Inclusion and Anti-Racism in the College Classroom" guide (Blonder et al., 2022).[3]
4 Iowa State University Extension and Outreach's "Food Systems Practitioner and Education Resource Database."[4]
5 Sustainable Agriculture Education Association and Agriculture, Food, and Human Values Society's jointly-hosted "Food Justice Curriculum Library."[5]
6 Stanford Environmental Justice Working Group's "Advancing Environmental Justice Pedagogies" whitepaper (Diver et al., 2023).[6]

Instructors can supplement their self-study and reflection by learning from and/or partnering with existing equity-centered initiatives at their own universities. Doing so may not only foster cross-campus collaborations but may help legitimize and bolster such efforts (particularly those that face threats of defunding, censorship, or dissolution). In 2023, for example, Oregon State University Extension partnered with the Rogue Valley Food System Network and Southern Oregon University to offer the OSU Anti-Racist and Decolonial Agriculture Winter Speaker Series Session (2023). Hughes-Barrow's (2023) "Decolonizing Education" website analyzes educational equity at Michigan State University and provides resources for MSU instructors, administrators, and students to advance equity and justice, and provides a replicable model for other campuses.

2 https://justfood.landfood.ubc.ca/
3 https://zenodo.org/records/5874656
4 https://foodsystemsdb.extension.iastate.edu/
5 https://drive.google.com/drive/folders/1wlhM263Su1s0Vg9Q8aly7IrfKlfJ30aT
6 https://www.ejstanford.com/ej-pedagogy.html

Kansas State University's biology program offers curated resources to help biology instructors implement antiracist pedagogy; agricultural and food systems programs can adopt similar resource pages (Kansas State University Division of Biology, n.d.). Numerous instructors and extension educators who teach in the University of Connecticut's College of Agriculture, Health, and Natural Resources are part of a Working Group on Structural Racism (University of Connecticut, 2020).

8.2.2 Expand their course content and pedagogical practices

Instructors can set goals for including more equity-centered content and pedagogical practices into their courses. For example, in June 2020, students, faculty, and staff from UC Berkeley's ESPM Department wrote an open letter to faculty and administrators calling for deeper justice and equity engagement in the program, including a demand to "revise all course syllabi to include 50% or more Black scholars and scholars of color by Fall 2020" (ESPM Graduate Diversity Council, 2020). While the ESPM program replied that it cannot make this practice mandatory for all instructors, it agreed to provide a robust suite of resources to instructors guiding them in incorporating readings by people of color (ESPM Faculty, 2020). Expanding course content not only involves diversifying the representation of authors in the readings. It also requires teaching a history of food systems that grapples with the violence perpetrated against Indigenous people and land, slavery and systemic racism, resource extraction, and other forms of injustice. Instructors that already employ critical social science lenses in class can consider further incorporating environmental justice, Indigenous, Black, intersectional feminist, and queer epistemologies (Tyler, 2020; Hess, 2021, Navarro, 2022). For example, in Spring 2022, the University of Vermont's Teach for Justice Lab launched "a student-led initiative to advocate for greater visibility and exposure to Indigenous perspectives within the UVM College of Education and Social Services. This initiative led to the creation of a report and proposal, which included findings from a student survey as well as recommendations for curriculum innovation and faculty support." Furthermore, instructors in The Ohio State University's Women's, Gender and Sexuality Studies planned a program called "This Land: A Feminist Ohio Field School" to "foreground a collective process of grappling with how students and teachers at OSU are situated within the legacies and contemporary manifestations of settler colonialism in Ohio," including a discussion of the nationwide land-grant university legacy (Livable Futures, 2020). (The program, planned for Spring 2020, was unfortunately canceled due to COVID 19). In addition to expanding course content, instructors can simultaneously strive to evolve their teaching practices. One impactful means of doing so is finding creative ways to empower students to shape the curriculum, such as through student-led discussions or syllabus co-creation. As White (2003, p. 394) emphasizes in her reflections on the Kufundisha teaching model, students should be "involved in the direction of the class". Several instructors who provided their syllabi for this study noted that the syllabi were a first draft, and that after presenting the draft to students in the first days of class, the students and instructors then collaboratively agreed on adaptations and additions. Another crucial equity-centered practice, for instructors of couses that involve service-learning or community-based research with community partners, is striving toward equitable partnerships. Instructors should actively combat the power imbalances inherent to "academic supremacy," which—if unchecked— frequently results in community partners having less transparency and agency in the project, and receiving only a minute fraction of grant funds allotted for the academic-community partnership (Porter and Wechsler, 2018).

8.2.3 Empower the next generation of teachers

Instructors can design their courses to allow graduate and undergraduate student instructors and teaching assistants to take on greater leadership and responsibility. For example, Galt et al. (2013b) co-designed a UC Davis FSE course among a team of students and faculty in which student teaching assistants led lab sections, discussions, and field trips. Nordstrom et al. (2022) describe the Undergraduate Agroecology Research Fellows program at the University of Vermont, which supports students in shaping an advanced agroecology course and participating in the campus's Agroecology and Livelihoods Collaborative Community of Practice. UC Berkeley's Foodscape Mapping Project, organized around the philosophy of democratic knowledge production, supports student fellows in research projects of their design, interrogating campus food systems and proposing solutions for advancing justice, health, and sustainability (Fanshel and Iles, 2022). Furthermore, graduate student participants in the Food Dignity project describe how graduate students occupy a "third space" between hierarchical academia, undergraduate students new to this hierarchy, and community partners (p.3). Their participation from this "third space" can make undergraduate student learning and community partnerships more approachable and equitable (Bradley et al., 2018). Instructors can also help create and support programs to enrich student instructor training. For example, the UC Berkeley School of Public Health ARC4JSTC (Anti-Racist Community for Justice and Social Transformative Change) program, "a comprehensive, multiyear antiracist change initiative encompassing faculty and workforce development, student experience, curriculum and pedagogy, community engagement outreach, and business processes," created a Antiracist and Racial Justice Praxis graduate student elective (Allen et al., 2023). The elective strove to "cultivate student champions to develop an antiracist analysis of public health, present a set of antiracist public health tools, and build skills necessary for advancing an antiracist agenda within the field" (p. 13). Furthermore, when serving on faculty search committees, instructors can also actively seek opportunities to advocate on behalf of scholars of color who are new to the academy. Established instructors can also partner to co-teach FSE courses with new instructors in other departments, especially those within humanities and ethnic studies departments. New instructors may face greater barriers in obtaining the departmental resources needed to teach an FSE course. Reaching across departments can enhance interdisciplinarity, increase the representation of humanities and ethnic studies perspectives into FSE, provide an onramp for new FSE instructors, and introduce a broader range of students to FSE.

8.2.4 Participate in movements for curricular reform

Beyond revising their course content and pedagogical approach, instructors striving toward antiracism can become involved in organizing within and beyond campus (Kishimoto, 2018). For example, instructors can publicly support and defend forms of critical pedagogy. Those working at universities located in states with passed or pending "anti-CRT" (critical race theory) legislation can contest such legislation by publishing op-eds and articles, engaging state and federal policymakers, providing public comments, and pressuring university leadership to uphold the importance of critical thought in higher education. More

established instructors—who may have greater job security than newer instructors—can play a particularly impacful role by leveraging their academic, media, and political influence. Instructors can also interrogate their disciplines and participate in campaigns seeking to evolve them toward deeper justice (Morales-Doyle, 2017; Cronin et al., 2021). For example, Rethinking Economics (2024) is a global movement striving to reshape the field of economics and its teaching in order to better inform solutions to climate change and global inequality. In the field of life sciences, the Partnership for Undergraduate Life Sciences Education (PULSE) 501c3 organization works to "provide academic departments with resources and skills that promote alignment of undergraduate life sciences programs with best educational practices, including… the removal of barriers to access, equity, and inclusion, and the adoption of evidence-based teaching and learning practices" (Brancaccio-Taras et al., 2022). Instructors can support efforts to reimagine their own department's policies and curricula (Hagopian et al., 2018; Bratman and DeLince, 2022; Lewis et al., 2022; Osiecki and Mejia, 2022). Instructors interested in leading such initiatives may consider applying for a USDA Higher Education Challenge (HEC) Grant (NIFA, 2023b). HEC grants support grantees at land-grant universities to conduct educational innovations within food and agriculture programs, and HEC grants have supported equity-centered pedagogy projects (Valley et al., 2020; Dring et al., 2022). A network of instructors, administrators, researchers, and their community partners could apply for a USDA HEC grant to establish an inter-university network with the resources and expertise to partner directly with university departments to help collaborate in adapting food systems education degrees, programs, and individual courses for deeper equity and action.

8.2.5 Direct attention, partnerships, and resources toward HBCUs and TCUs

The 19 HBCUs and 35 TCUs within the LGU system not only comprise robust FSE expertise and resources, but also lead the nation in generating antiracist, anticolonial food systems scholarship (Phillips, 2011; Crazy Bull, 2013; Echo Hawk et al., 2015; Indigenous Food and Agriculture Initative, 2015; Reese, 2018). Reflecting on her role teaching food studies at an HBCU, Reese (2018, n.p.) emphasizes "The study of food at any HBCU is significant. Food—a lifeline for individual and community health and wellbeing—is both a cultural and social symbol. Black people have navigated enslavement, Jim Crow laws, and anti-Black racism. Food has been a constant marker of the social climate during all these periods, an artifact of the creative ingenuity of people on the weightier end of oppression". Instructors at 1862 LGUs should advocate for more just state and federal funding for 1890 (HBCU) and 1994 (TCU) LGUs. When HBCUs and TCUs seek inter-institutional partnership, 1862 LGU instructors should strive to make such partnerships equitable and mutualistic.

8.3 The call

To present instructors with examples of various approaches to teaching FSE, a syllabus website (see Footnote 1) has been launched sharing the subset of syllabi included in this analysis for which instructors provide consent for public posting. A virtual FSE instructor email network has also been formed, in which participants can share resources and build community around a shared commitment to leveraging FSE to train students to help create a more just, sustainable world. Today, LGU instructors have access to a full toolbox of resources to teach FSE courses that train students to transform food systems. For all those motivated to advance transformative higher education food systems praxis, we heed the call: "If not now, when?" (Pirkei Avot 1:14, n.d.).

Data availability statement

The original contributions presented in the study are included in the article/Supplementary material, further inquiries can be directed to the corresponding author.

Ethics statement

Ethical review and approval was not required for the study on human participants in accordance with the local legislation and institutional requirements. Written informed consent from the participants or the participants' legal guardian/next of kin was not required to participate in this study in accordance with the national legislation and the institutional requirements.

Author contributions

CH: Conceptualization, Data curation, Formal analysis, Investigation, Methodology, Project administration, Validation, Visualization, Writing – original draft, Writing – review & editing. NC: Conceptualization, Data curation, Investigation, Methodology, Validation, Writing – original draft, Writing – review & editing. ML: Conceptualization, Methodology, Supervision, Writing – original draft, Writing – review & editing. CW: Conceptualization, Methodology, Supervision, Writing – original draft, Writing – review & editing. KO: Conceptualization, Methodology, Supervision, Writing – original draft, Writing – review & editing. MW: Conceptualization, Methodology, Supervision, Validation, Writing – original draft, Writing – review & editing. SE: Conceptualization, Methodology, Supervision, Writing – original draft, Writing – review & editing. JB: Conceptualization, Methodology, Supervision, Validation, Writing – original draft, Writing – review & editing. CG: Conceptualization, Funding acquisition, Methodology, Supervision, Writing – original draft, Writing – review & editing.

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Supplementary material

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