

Sustainable Culinary Education: A Community-Engaged Approach to Building a Resilient Food System

A Master of Arts Project Defense

By

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Abstract

This project presents a curriculum for culinary schools who wish to integrate sustainability principles into culinary education through a community-engaged approach. Responding to the pressing need for sustainability in the food industry, the curriculum combines theoretical foundations with experiential learning, enabling students to engage deeply with concepts such as sustainable sourcing, food sovereignty, and the circular economy. Grounded in educational theories like transformative learning and experiential learning, the curriculum emphasizes critical reflection, collaboration, and active participation in sustainable practices. Students participate in field trips, volunteer with local food organizations, and develop zero-waste menus, bridging academic knowledge with practical application. This curriculum also incorporates non-Western perspectives and promotes eco-justice, fostering an appreciation for cultural diversity and food justice. By building partnerships with local farms and community programs, students are encouraged to view sustainability as integral to their personal and professional identities, preparing them to become agents of change within the food system.

Introduction

The growing emphasis on sustainability as a priority for individuals, communities, corporations, and governments worldwide has created an urgent need for educational institutions to integrate effective sustainability practices into their curricula. Career and technical education disciplines, such as culinary education, are no exception to this global trend. They face a pivotal shift towards incorporating sustainability constructs into curricula to prepare a future workforce capable of navigating the complex challenges of upholding sustainable practices (Benjamin et al., 2010). Despite the culinary world's direct relation to the food system, there is a lack of theoretical and practical knowledge regarding how to best integrate sustainability principles within the current culinary education framework, which has historically favored the development of practical skills over theoretical knowledge (Bertoldo, 2022; Franchini, 2024).

As such, this paper proposes a curriculum designed to complement the preexisting structure of a typical culinary education. The curriculum combines theoretical knowledge with hands-on practice, enabling students to engage with sustainability principles in ways directly relevant to their passion for food and the culinary arts. By fostering relationships between students, community members, and the surrounding environment, the curriculum highlights opportunities for chefs and other food professionals to make immediate impacts within the food system. Through local actions that address global issues, students gain an understanding of how small-scale initiatives can drive measurable change, increasing the relevance and importance of sustainable practices in their lives. Moving beyond traditional technical education, this curriculum offers students the freedom to explore sustainability concepts in a way that is pertinent to them in relation to their personal and professional goals.

Literature Review

The demand for effective sustainability education in the culinary field mirrors broader societal concerns about climate change, biodiversity loss, food insecurity, and the environmental impacts of current agricultural practices. Traditional culinary education often focuses on the development of technical skills, with limited attention towards developing critical thinking or guiding students through the exploration of complex ideas. However, sustainability is a complex, “wicked”, problem requiring interdisciplinary collaboration and cooperation across sectors to achieve meaningful change (Pryshlakivsky & Searcy, 2012). This curriculum not only addresses this gap but also equips students with the knowledge to understand the interconnected challenges throughout the entire food system, from production and distribution to consumption and waste management. By fostering critical analysis and reflective thinking, the curriculum prepares students to collaborate with professionals and their works from diverse fields—such as agriculture, environmental science, policy, and social justice—to devise innovative solutions. Building off Dewey’s (1902) philosophy that education should be connected to students’ lived experiences and social environments, the curriculum integrates real-world projects and community engagement, making sustainability more relevant and impactful. By encouraging students to reflect on these experiences, the curriculum not only deepens their understanding but also fosters a sense of responsibility, preparing them to work alongside diverse professionals and make informed, impactful decisions for a more sustainable food system.

While sustainability is often framed through environmental, social, and economic lenses, Purvis et al. (2018) highlight the term’s diverse historical roots, resulting in varied interpretations. In this curriculum, environmental and social sustainability are central, while financial sustainability serves to underscore the importance of the other two dimensions. Additionally, this curriculum introduces cultural and mental aspects of sustainability, broadening the traditional framework for a more holistic learning experience. This approach challenges the common notion that education’s primary purpose is to drive personal and national economic development (Gruenewald, 2003).

Foundational Educational Theories

This curriculum is grounded in educational theories that leverage personal experiences to facilitate positive behavior change. The application of Mezirow’s (2018) transformative learning theory encourages critical reflection and open dialogue, inviting students to question traditional perspectives and adopt more inclusive viewpoints. The curriculum will achieve more than the simple transmission of knowledge, cultivating competencies that empower students to think systemically, anticipate long-term consequences, engage with stakeholders, and act as agents of community change (Frisk & Larson, 2011). Moreover, transformative learning theory will make use of reflective learning and collaborative work with a focus on learning through inquiry, experience, and reflection (Burns, 2011). This approach not only imparts essential skills, but also nurtures a mindset attuned to sustainability. Here, students are not simply passive recipients of information but are active participants in their learning.

Experiential learning theory further enhances this curriculum by presenting sustainability challenges through concrete experiences and allowing students the time to participate in reflective observation, abstract conceptualization, and active experimentation (Kolb, 2014). This approach aligns with Thorp’s (2005) findings that hands-on interactions with nature, such as school gardening, improve learning by grounding education in tangible experiences. Thorp

emphasizes that engaging with natural cycles, like plant growth and seasonal changes, helps students understand environmental rhythms, fostering a reciprocal relationship with the land. This curriculum provides students with opportunities to personally engage with the natural environment, encouraging them to view their role within the food system as reciprocal rather than transactional (Kimmerer, 2013).

Land-based learning theory, developed by McKim et al (2019), is also used in the development of this curriculum as it involves students in hands-on, community-based projects that foster systems thinking and problem-solving skills while demonstrating the direct impact of sustainable practices on their community. Gruenwald (2003) stresses how a sense of place can be utilized to engage students within the context of their local environment and allows educators to reimagine social and ecological well-being as being part of the criteria for educational success. Collectively, these theories provide a foundation for developing environmentally responsible culinary professionals who are deeply connected to their community and committed to sustainable food systems.

An eco-justice pedagogy further strengthens this curriculum by blending sustainability with cultural diversity and social equity (Bowers, 2001). This approach emphasizes the importance of contributing to local communities and fostering ecological preservation alongside social well-being. The curriculum also introduces relationality—a concept within eco-justice pedagogy that illustrates how everything comes into being through its relationship with other entities—helping students connect culinary practices with their broader social, cultural, and environmental implications (Martusewicz, 2018). To combat the homogenizing effects of globalization, a sustainability-focused curriculum must prioritize non-Western perspectives and traditional practices. Incorporating teachings on culturally significant ingredients, traditional cooking methods, and diverse food systems is crucial to resisting the dominance of Western approaches in education (Bowers, 2001; Martusewicz, 2018). By broadening students’ perspectives, the curriculum honors the wisdom inherent in various culinary traditions, as emphasized by Kapelari (2020), who warns that an anthropocentric focus, dominant in Western culture, risks overshadowing valuable practices from other cultures.

Supplemental Concepts

The integration of a circular economy framework into the curriculum enables students to understand the broader impact of their professional decisions. By emphasizing sustainable sourcing, the curriculum demonstrates the waste reduction and resource retention benefits of local networks and centralized distribution (Grèzes-Bürcher & Grèzes, 2023). Students will develop menus prioritizing local suppliers and seasonal availability, encouraging direct partnerships with farmers to support minimal waste practices.

Additionally, this curriculum will also address the growing number of social movements, illustrating how local efforts can influence global outcomes. Introducing practices such as urban agriculture, food collectives, and bolstering support for local suppliers exposes students to ethical and sustainable food sourcing options. Moreover, the curriculum will connect students with community-based food operations, such as community kitchens and gardens, highlighting food’s role in building resilient and sustainable communities. By emphasizing food as a multifaceted entity capable of creating social and cultural connections, the curriculum prepares students to be

informed advocates for socio-cultural movements, empowering them to navigate systems often plagued by labor and resource exploitation (Sumner, 2013).

Lastly, this curriculum will aim to bring value to both community and individual well-being. The connection between sustainability and personal wellness suggests that an individual's happiness is intertwined with the health of their environment and community (Bartels & Parker, 2023). By teaching students to explore and appreciate this connection through contemplative practices and mindfulness exercises, the curriculum will promote sustainable lifestyles, fostering both individual and collective well-being.

In conclusion, this framework establishes a comprehensive approach to sustainability in culinary education, addressing environmental, social, and economic challenges through an interdisciplinary approach. By incorporating foundational theories such as transformative learning, experiential learning, and land-based learning, the curriculum equips students with the critical thinking, practical skills, and reflective mindset needed to engage deeply with sustainability. Furthermore, it introduces students to concepts like circular economy, eco-justice, and relationality, expanding their understanding of food systems' global and local impacts. Through community engagement, culturally diverse perspectives, and a focus on personal and collective well-being, the curriculum empowers students to become responsible culinary professionals and advocates for sustainable food systems, ready to drive meaningful change in their communities and beyond.

Methods

Process

This curriculum was developed using a reflective, theory-driven approach based on my dual background in liberal arts and technical education. Recognizing the need for culinary programs to address the complex issue of sustainability, I sought to create a curriculum that goes beyond technical skill development, encouraging critical thinking and personal reflection within the culinary field. Drawing from my experiences as a culinary professional, I incorporated both practical and theoretical elements to nurture a comprehensive understanding of sustainability among students. The curriculum's foundation is rooted in transformative learning theory, experiential learning theory, and land-based learning theory. Transformative learning theory (Mezirow, 2018) guided the design of modules that challenge students' preconceptions and foster open dialogue, enabling a deeper connection with sustainability as they reflect on their roles as culinary professionals. Experiential learning theory (Kolb, 2014) informed the inclusion of hands-on activities, such as field trips, community engagement, and reflective journaling, allowing students to internalize sustainability concepts through direct experience. Lastly, land-based learning theory (McKim et al., 2019) provided a framework for community-oriented learning activities, emphasizing students' connection to local food systems and the environment.

Structure

Each module in the curriculum is thoughtfully designed to align with the core pillars of sustainability—environmental, social, and economic—while also incorporating cultural and mental dimensions. The activities include lectures, group discussions, field trips, case studies, and guest speakers, all structured to foster both individual reflection and collaborative learning. In certain instances, particularly when the goal is to cultivate a student's interest in nature, experiential learning activities are conducted prior to lectures. This approach draws on research

by Ebbini (2022), which found that students engaged in experiential learning exhibited a significantly enhanced ability to holistically integrate biophilic principles. This structure not only equips students with practical skills but also nurtures a comprehensive understanding of how their choices impact food systems and empowers them to engage more effectively with their communities.

Evaluation and Assessment

To evaluate the curriculum's effectiveness, formative assessments were integrated into each module, as well as a summative assessment at the conclusion of the course. Formative assessments, including reflective journals and participation in discussions, allow for continuous monitoring of students' progress. The summative assessment, a sustainability audit, will provide a comprehensive evaluation of their grasp of core concepts. Rubrics were developed to offer transparent evaluation criteria, allowing students to understand expectations and specific learning outcomes.

Results

Course Title – *Sustainability: A Community-Engaged Approach to Building a Resilient Food System*

Course Description

This course explores the intersection of culinary arts and sustainability, empowering future chefs and food professionals to become advocates for sustainable food systems within their communities. Students will explore essential topics such as sustainable agriculture, ethical sourcing, circular economy practices, and food sovereignty, learning how these principles can inform culinary operations. Through a blend of lectures, fieldtrips, community engagement, and reflective practices, students will gain a holistic understanding of the food system and its social, environmental, and economic impacts.

Designed with a strong emphasis on experiential learning, this curriculum integrates real-world projects, such as volunteer work with local food programs and the chance to visit farms and other food producers that utilize sustainable practices, to foster critical thinking and personal reflection. By the end of the course, students will be equipped with the knowledge and skills to implement sustainable practices in the kitchen, support community food initiatives, and champion food justice and cultural preservation in the culinary field. This course prepares students to not only succeed as culinary professionals but also to contribute meaningfully to creating resilient and sustainable communities.

Course Structure

1. *Contemplative Practices (10-15 minutes)*
 - Each class begins with mindfulness exercises, such as breathwork, journaling, meditation (etc.), to foster self-awareness and resilience. These practices build a foundation for “mental sustainability,” helping students develop strategies to manage stress and enhance focus, both crucial for future culinary professionals.
2. *Lectures (30-40 minutes)*
 - Lectures introduce foundational concepts and provide the theoretical grounding for each module. Lectures will integrate case studies, real-world examples, and

interactive elements, such as live polling, to encourage active participation and real-time feedback on student understanding.

3. *Guided Discussions and Group Work (20-30 minutes)*
 - Following each lecture, students will engage in structured discussions and group activities to analyze key issues presented. These sessions encourage collaborative problem-solving, critical thinking, and diverse perspectives. Group assignments include case studies and other scenario analyses.
4. *Fieldtrips*
 - Modules include field trips to community gardens, local farms, and sustainability-focused culinary operations, giving students firsthand exposure to sustainable practices. Fieldwork is supplemented by reflective assignments where students document observations and analyze how these practices could be integrated into their future careers.
5. *Guest Speakers (Varies by Module)*
 - Industry professionals, sustainable chefs, and representatives from community organizations will speak on topics relevant to each module, providing practical insights and connecting students with potential mentors. Each guest speaker session concludes with a Q&A, encouraging students to engage directly with leaders in the field.
6. *Reflective Journaling and Assignment Submissions*
 - Journal entries prompt students to reflect on course content, field experiences, and personal growth. Assignments throughout the course include structured reflections, sustainability project planning, and menu development with ethical sourcing and zero-waste strategies.
7. *Capstone Project (Final Module)*
 - The course culminates in a capstone project where students design a comprehensive sustainability plan for a culinary operation. This project integrates all course learnings, requiring students to demonstrate proficiency in sustainable sourcing, waste reduction, and community engagement. Students will present their projects to the class, receiving peer feedback and instructor evaluation.

Learning Objectives

By the end of the course, students will be able to:

1. *Analyze Sustainable Agricultural Practices*
 - Evaluate principles and practices of sustainable agriculture by conducting a comparative analysis of conventional vs. sustainable farming techniques.
 - Identify specific methods (e.g., organic, regenerative) that reduce environmental impact.
2. *Design Ethical Sourcing Strategies*
 - Develop an ethical sourcing plan for culinary operations, prioritizing local, seasonal, and fair-trade products.
 - Assess suppliers using established criteria for sustainability, cost, and ethical practices, demonstrating the ability to balance these factors in decision-making.
3. *Apply Circular Economy Principles to Culinary Operations*

- Implement a zero-waste plan for a multi-course menu by identifying waste reduction opportunities through ingredient reuse and process optimization.
 - Track food and resource waste and identify alternative methods to avoid and/or develop alternative uses for waste.
4. *Understand the Relationship Between Social Justice and Environmental Justice*
- Participate in a community food program (e.g., community kitchen, food bank, community garden) and document contributions, including specific activities and community impact.
 - Reflect on the role of these programs in promoting food access and community resilience through a structured reflection assignment.
5. *Evaluate Food's Role in Social Cohesion and Cultural Diversity*
- Critically assess how various food traditions and non-Western culinary practices contribute to cultural preservation and sustainability.
 - Develop a project showcasing how Indigenous or non-Western food practices can be incorporated into modern culinary settings, emphasizing sustainability and cultural appreciation.
6. *Cultivate Mental Sustainability and Mindfulness*
- Practice contemplative techniques such as breathwork and journaling to build resilience and self-awareness.
 - Reflect on personal and professional growth through a journal or portfolio submission, showing how mindfulness practices have influenced their approach to sustainability.

Course Contextualization

This course is 3-credit hours offering designed to balance theoretical learning with experiential engagement. Students will meet for a total of three hours per week, divided into two sessions. The first session (1.5 hours) takes place in the classroom, focusing on lectures, discussions, and collaborative activities. The second session (1.5 hours) is devoted to field trips and volunteer work, providing immersive, hands-on learning experiences that connect students directly with sustainable food systems. Ideally, this course is to be positioned in the third semester of a four-semester program. This timing allows students to build on foundational culinary skills and educational theories while preparing them to integrate sustainability principles into their capstone projects and future careers. While there are no essential prerequisites, the placement of this course in the third semester allows students to have a baseline of culinary knowledge and skills before being challenged to operate in a more sustainable manner.

Module 1: Introduction to Sustainability and the Role of the Chef

Topics

- Introduction to sustainability.
- The chef's role in sustainable practices and community impact.
- Overview of environmental, social, and economic sustainability.

Learning Objectives

By the end of this module, students will:

1. Define sustainability within the context of culinary arts and food systems.
2. Identify the environmental, social, and economic pillars of sustainability.

3. Articulate the responsibilities of culinary professionals in promoting sustainable practices.

Key Concepts

- Sustainability: Understanding sustainability’s three pillars as they apply to food systems.
- Culinary professional’s relationship with the food system.
- Systems Thinking: Viewing food systems holistically to assess impacts on communities and ecosystems.

Activities

Lecture: Overview of sustainability, including definitions, challenges, and the role of the culinary industry.

Group Discussion: Students discuss examples of restaurants or chefs that have embraced sustainability. Explore what made their approach successful and how it could be applied in different settings.

Assignment

Reflection Paper: Students will write a personal reflection on their connection to sustainability and what they hope to achieve as future culinary professionals. They will identify at least one sustainability challenge they want to address in their future careers.

Criteria	Excellent (90-100%)	Good (80-89%)	Satisfactory (70-79%)	Needs Improvement (60-69%)	Unsatisfactory (<60%)
Depth of Reflection	Thoughtful and deeply reflective, connecting personal values with sustainability goals.	Strong reflection with some personal insights.	Basic reflection, minimal personal insight.	Limited reflection, little connection to sustainability goals.	Lacks reflection and personal connection.
Identification of Challenge	Clearly identifies a relevant and specific sustainability challenge with supporting rationale.	Identifies a relevant challenge with limited rationale.	Challenge is vague or lacks clarity.	Minimal effort to identify a challenge.	Challenge is absent or irrelevant.
Organization and Clarity	Well-organized, clearly written, and engaging.	Organized and mostly clear.	Some organizational issues or lack of clarity.	Lacks organization, difficult to follow.	Unorganized, unclear, and difficult to read.

Suggested Readings

Barber, D. (2014). *The third plate: Field Notes on the Future of Food*. Penguin.

Bittman, M. (2008). *Food matters: A Guide to Conscious Eating with More Than 75 Recipes*. Simon and Schuster.

Gössling, S., & Hall, C. M. (2021b). *The sustainable chef: The Environment in Culinary Arts, Restaurants, and Hospitality*. Routledge.

Module 2: Connecting with Nature through Food

Topics

- The concept of biophilia and its application to culinary education.
- Engaging with nature through foraging, farm visits, and urban agriculture.
- Creating meaningful connections between food practices and natural ecosystems.

Learning Objectives

By the end of this module, students will:

1. Understand the concept of biophilia and its relevance to culinary arts.
2. Reflect on experiences of connecting with nature through activities like foraging or farm visits.
3. Propose ways to integrate biophilic principles into culinary practices, fostering respect for natural ecosystems.

Key Concepts

- Biophilia: The inherent human connection to nature and its importance in culinary arts.
- Foraging and Farm Visits: Practical experiences that strengthen students' relationships with food sources.
- Nature-Based Culinary Practices: Techniques that emphasize harmony with natural cycles and ecosystems.

Activities

- Fieldtrip: Visit a local community garden, urban farm, or foraging site. Students engage in hands-on activities, such as planting or harvesting.
- Guest Speaker: Invite a local forager or urban farmer to share their experiences and insights on what inspires them to pursue sustainable practices.
- Lecture: Introduction to biophilia and its role in sustainability. Discuss examples of foraging, urban farming, and local food movements.

Assignment

Reflection Journal: Students document their field experience and reflect on how active participation in nature affects their views on sustainability. They will submit a brief paper detailing the day's activities with a reflection included.

Criteria	Excellent (90-100%)	Good (80-89%)	Satisfactory (70-79%)	Needs Improvement (60-69%)	Unsatisfactory (<60%)
Depth of Reflection	Thoughtful and deeply reflective, connecting personal values with sustainability goals.	Strong reflection with some details and personal insights.	Basic reflection, minimal personal insight.	Limited reflection, little connection to sustainability goals.	Lacks reflection and personal connection.
Observational Detail	Provides detailed, descriptive account of experience, with specific examples.	Thorough observations, with some specific examples.	Basic observations, limited specific examples.	Few observations, lacks specificity.	Observations are missing or irrelevant.
Connection to Course Concepts	Demonstrates strong understanding of how the field	Shows understanding with some	Basic connection to course concepts.	Minimal connection to course material.	No connection to course material.

	experience relates to course material.	connection to concepts.			
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Suggested Readings

- Kimmerer, R. (2013). *Braiding sweetgrass: Indigenous Wisdom, Scientific Knowledge and the Teachings of Plants*. Milkweed Editions.
- Kingsolver, B. (2010). *Animal, vegetable, miracle: Our Year of Seasonal Eating*. Faber & Faber.
- Petrini, C. (2013). *Slow Food Nation: Why Our Food Should Be Good, Clean, and Fair*. Rizzoli Publications.
- Thorp, L. (2005). *The Pull of the Earth: Participatory Ethnography in the school garden*.
<http://ci.nii.ac.jp/ncid/BA77258935>

Module 3: Sustainable Agriculture and Ethical Sourcing

Topics

- The food system.
- Principles of sustainable agriculture.
- Ethical sourcing practices: Local, organic, fair trade, and sustainable.
- Building relationships with farmers and other types of suppliers.

Learning Objectives

By the end of this module, students will:

1. Understand the food system, and their place within it.
2. Understand the principles and practices of sustainable agriculture.
3. Develop an ethical sourcing strategy for culinary operations.
4. Build skills to assess and select sustainable suppliers.

Key Concepts

- Sustainable Agriculture: Focus on practices that protect the environment, support farmers, and enhance food quality.
- Ethical Sourcing: Explore the importance of sourcing local, seasonal, and fair-trade products, and the challenges of balancing cost with sustainability.
- Tragedy of the Commons

Activities

- Fieldtrip: Visit a sustainable farming operation (Organic, Regenerative, Mixed, Intensive etc.). Students learn directly from producers about the challenges and benefits of sustainable farming practices.
- Lecture: Overview of sustainable agriculture and sourcing practices. Explore real-world examples of restaurants that prioritize ethical sourcing.

Assignment

Students will create a 5-course menu (canapé, soup, salad, entrée, desert) using ingredients from at least 3 sustainable, seasonal, ethical, and possibly local suppliers. For at least 3 of the suppliers the students will research them and provide reasoning as to why they believe their products are a sustainable choice.

Criteria	Excellent (90-100%)	Good (80-89%)	Satisfactory (70-79%)	Needs Improvement (60-69%)	Unsatisfactory (<60%)
Menu Design	Creative, seasonally	Well-designed menu, mostly	Basic menu with some	Menu is minimally	Lacks attempt at showcasing

	appropriate menu that reflects sustainability principles.	seasonally appropriate.	sustainability focus.	sustainable or not seasonally appropriate.	sustainability or seasonality.
Sourcing Justification	Comprehensive, well-reasoned justifications for supplier choices.	Sound justifications, though limited in detail.	Basic rationale, lacks depth or specificity.	Minimal justification for supplier choices.	Lacks sourcing justification.
Understanding of Sustainable Sourcing	Demonstrates advanced understanding of sustainable sourcing.	Shows good understanding of sustainable sourcing.	Basic understanding, with some misinterpretations.	Minimal understanding or inaccurate interpretation.	Lacks understanding of sustainable sourcing.

Suggested Readings

- Ackerman-Leist, P. (2013). *Rebuilding the foodshed: How to Create Local, Sustainable, and Secure Food Systems*. Chelsea Green Publishing.
- Benjamin, D., & Virkler, L. (2016). *Farm to table: The Essential Guide to Sustainable Food Systems for Students, Professionals, and Consumers*. Chelsea Green Publishing.
- Berry, W. (1996). *The Unsettling of America: Culture and Agriculture*. Turtleback Books.
- Pollan, M. (2007). *The Omnivore's Dilemma: A Natural History of Four Meals*. Penguin.
- Tickell, J. (2017). *Kiss the ground: How the Food You Eat Can Reverse Climate Change, Heal Your Body & Ultimately Save Our World*. Simon and Schuster.

Module 4: Circular Economy in the Culinary World

Topics

- Concepts of circular economy and zero-waste in culinary operations.
- Techniques for minimizing food waste in the kitchen, including nose-to-tail and root-to-leaf cooking.
- Sustainable waste management practices, such as composting and recycling.

Learning Objectives

By the end of this module, students will:

1. Explain the concept of a circular economy and its relevance to culinary operations.
2. Develop strategies for reducing food waste through innovative cooking and waste management techniques.
3. Implement a waste reduction plan that addresses food preparation, service, and disposal.

Key Concepts

- Circular Economy: A system that aims to eliminate waste and continually reuse resources.
- Zero-Waste Cooking: Culinary techniques that reduce or repurpose kitchen waste.

Activities

- Lecture: Discuss the circular economy and its relevance to culinary arts. Explore examples of zero-waste restaurants and sustainable food recovery systems.
- In-class Workshop: Students work together to brainstorm ways to reduce waste in their home or professional kitchens, sharing tips and techniques.

Assignment

Zero-Waste Plan: Students will take their 5-course menu from the previous module and apply a zero-waste approach to it. Students will track all waste produced by their menu and rewrite their menu to incorporate as much of the waste as possible. For what cannot be used in the new students will create a subsection to their menu that documents all the waste and propose alternative uses. The goal is to have as little waste as possible generated from their menu.

Criteria	Excellent (90-100%)	Good (80-89%)	Satisfactory (70-79%)	Needs Improvement (60-69%)	Unsatisfactory (<60%)
Zero-Waste Integration	Menu effectively incorporates zero-waste principles, with creative solutions for waste items.	Menu integrates zero-waste concepts with some creativity.	Basic zero-waste attempts, but limited creativity.	Minimal zero-waste integration, lacks practicality.	No attempt at zero-waste integration.
Waste Tracking and Analysis	Comprehensive tracking of all waste items, with thoughtful analysis of reduction methods.	Thorough tracking with limited analysis.	Basic tracking with minimal analysis.	Minimal tracking, lacks meaningful analysis.	No tracking or analysis of waste.
Alternative Uses for Waste	Proposes innovative and realistic alternative uses for all waste items.	Provides alternative uses for most waste items.	Basic suggestions for alternative uses.	Minimal suggestions, impractical or irrelevant.	No alternative uses proposed.

Suggested Readings

Bonneau, A. (2021). *The Zero-Waste chef: Plant-Forward Recipes and Tips for a Sustainable Kitchen and Planet*. Penguin.

Foundation, J. B. (2018). *Waste not: How To Get The Most From Your Food*. National Geographic Books.

Grèzes-Bürcher, S., & Grèzes, V. (2023). *Designing a sustainable, circular culinary system*. Circular Economy and Sustainability. <https://doi.org/10.1007/s43615-023-00295-w>

Henderson, F. (2004). *The whole beast: nose to tail eating*. Harper Collins.

Module 5: Community Food Programs

Topics

- Understanding food insecurity and its impact on communities.
- The role of community food programs in promoting food access and resilience.
- Engagement with food banks, community kitchens, and gardens to support local food security.

Learning Objectives

By the end of this module, students will:

1. Explain the role of community food programs in addressing food insecurity and fostering community resilience.
2. Analyze how food programs promote social equity and access within local communities.
3. Engage in volunteer work with a local food initiative, reflecting on the experience and its impact on food security.

Key Concepts

- Food Insecurity: Barriers to accessing sufficient and nutritious food.
- Community Resilience: Strengthening communities through food access and support systems.
- Social Equity in Food Access: The importance of equitable food distribution in promoting well-being.

Activities

- Lecture: Overview of food insecurity, its multifaceted causes, and the role of community food programs. Discuss case studies, such as The Stop, that integrate food, community, and sustainability.
- Case Study: During class time in groups, students will research a local food-based community outreach program and identify the ways in which they help address injustices and build more resilient communities. Groups will present their findings to the rest of the class.
- Community Service: Students volunteer at a local food bank, community kitchen, or community garden (or other organization of their choosing pending approval) assisting in their day-to-day operations.

Assignment

Reflection Paper: After participating in volunteer work with a local food program and learning about the role of community-based food initiatives, write a reflection (500 words) using the following prompts to help guide your writing (**do not** answer all the questions):

Mandatory Questions:

1. Describe your volunteer experience. What organization did you choose, and what were your primary tasks? How did your contribution impact the organization and the community it serves?

Optional Prompts (Pick One):

2. Community Engagement: How did your experience help you understand the role that food programs, such as community kitchens, food banks, or community gardens, play in building stronger, more resilient communities? Discuss specific examples from your volunteer work and the case studies presented in class.
3. Social Impact and Food Insecurity: Reflect on how the organization you worked with addresses food insecurity and social justice. What strategies or practices did you observe that help mitigate the root causes of food insecurity? How do these strategies align with the role of chefs and food professionals in promoting food access and sustainability?
4. The Power of Food: In what ways did your experience illustrate how food can be a tool for social engagement and relationship-building? Consider the connections between food, community engagement, and sustainability discussed in class.
5. Personal Takeaways: What are your personal takeaways from this experience? How has it influenced your understanding of the broader food system, community involvement, or your role as a future food professional or community advocate?

Criteria	Excellent (90-100%)	Good (80-89%)	Satisfactory (70-79%)	Needs Improvement (60-69%)	Unsatisfactory (<60%)
Description of Volunteer Experience	Provides a detailed, insightful description of the experience, including organization, tasks, and community impact.	Thorough description, covers organization and tasks with minor detail gaps.	Basic description of experience, minimal detail on community impact.	Limited description, lacks depth or clarity on role and impact.	No clear description of experience or impact.
Understanding of Community Engagement	Demonstrates deep understanding of community-based food initiatives' role in resilience, with specific examples.	Shows good understanding, uses examples but lacks depth.	Basic understanding, some examples from experience.	Minimal understanding, lacks clear examples or connections.	No clear understanding or examples of community engagement.
Social Impact and Food Insecurity Insights	Provides insightful reflections on food insecurity, social justice, and strategies for food access, linking to course content.	Shows good insights, some connection to social impact and course content.	Basic insights, minimal connection to food insecurity.	Limited insights, lacks understanding of social impact.	No insights or connection to food insecurity.
Illustration of Food as a Social Tool	Strong examples of how food fosters social engagement and relationship-building, reflecting course discussions.	Provides relevant examples, some connection to social engagement.	Basic mention of food's social role, lacks examples or depth.	Minimal mention of food as a social tool, lacks connection.	No mention of food's role in social engagement.
Personal Takeaways and Reflection	Thoughtful, personal takeaways that connect to broader food system understanding and professional growth.	Clear personal reflections, though limited in depth.	Basic personal takeaways, lacks connection to broader themes.	Minimal personal reflection, lacks depth or relevance.	No personal takeaways or meaningful reflection.

Suggested Readings

- Alkon, A. H., & Agyeman, J. (2011). *Cultivating food justice: Race, Class, and Sustainability*. MIT Press.
- Butler, C. T. L., & McHenry, K. (1992). *Food not bombs: How to Feed the Hungry and Build Community*. New Society Pub.
- Hewitt, B. (2010). *The town that food saved: How One Community Found Vitality in Local Food*. Rodale Books.
- Winne, M. (2009). *Closing the food gap: Resetting the Table in the Land of Plenty*. Beacon Press.

Module 6: Indigenous and Non-Western Food Practices

Topics

- The significance of food sovereignty in protecting and building sustainable food systems.
- The role of food sovereignty in promoting cultural sustainability and resisting the negative impacts of globalization.
- Indigenous approaches to food and land stewardship.
- The relationship between food, culture, and community.
- Learning about traditional Indigenous and non-Western agricultural practices, diets, and culinary techniques that align with sustainable practices.

Learning Objectives

By the end of this module, students will:

1. Understand the concept of food sovereignty and its importance in sustainability.
2. Recognize the contributions of Indigenous food practices to sustainable food systems.
3. Develop strategies to integrate Indigenous food practices into their own life.
4. Understand the role of chefs and food professionals in preserving cultural diversity and promoting food justice through sustainable practices.
5. Reflect on how globalization challenges food sovereignty and impacts the sustainability of Indigenous and local food systems.

Key Concepts

- **Food Sovereignty:** Explore the definition of food sovereignty, focusing on the right of people to define their own food systems, access culturally appropriate food, and sustainably produce it.
- **Sustainability and Sovereignty:** Understand how food sovereignty movements are essential to achieving broader sustainability goals and promoting cultural preservation.
- **Indigenous Food Systems:** Learn about Indigenous approaches to food production, land stewardship, and the cultural significance of food within Indigenous communities.
- **Cultural Preservation:** Learn how food and cultural are inherently connected and the importance of preserving traditional food preparation techniques.

Activities

- **Lecture:** Overview of food sovereignty and cultural sustainability. Explore the challenges posed by globalization on Indigenous and non-Western food systems. Introduce non-Western food practices (e.g., fermentation, foraging) and discuss how these techniques align with sustainable culinary operations.
- **Case Study:** Review a case study of an Indigenous community's approach to sustainable food production, exploring how traditional practices are being preserved and revived in modern contexts.
- **Guest Speaker:** Invite a representative from an Indigenous community to speak about their work and the importance of Indigenous food systems.
 - Additionally, have a chef such as Zach Keeshig, Joseph Shawana, or Johl Whiteduck Ringuette come to speak, or speak virtually.

Assignment

Students will explore an Indigenous food practice of their choice and reflect on its relevance to sustainability, cultural preservation, and modern culinary practices. This can be of any

Indigenous group from around the globe. This reflection will allow students to consider how Indigenous knowledge can inform modern sustainable culinary practices.

Requirements:

1. Research a Specific Indigenous Food Practice
 - Choose an Indigenous food practice (e.g., food preservation, foraging, seasonal harvesting, whole animal utilization) from any Indigenous culture.
 - Conduct research to understand the historical, cultural, and environmental significance of this practice.
 - Identify key sustainability aspects embedded in this practice (e.g., resource conservation, minimal waste, respect for natural cycles).
2. Reflective Analysis
 - Write a reflection analyzing what you learned about the chosen food practice.
 - Address the following questions in your reflection:
 - Cultural Significance: What did you learn about the cultural importance of this practice to the Indigenous community? How does it support or preserve cultural identity?
 - Sustainability Insights: How does this practice demonstrate sustainable food principles? What can culinary professionals learn from it about resource management, waste reduction, or environmental respect?
 - Application in Modern Culinary Settings: In what ways could this practice be adapted or respected in modern culinary operations? Consider potential benefits or challenges of incorporating these principles.
 - Personal Takeaways: How has this research impacted your understanding of Indigenous food practices and your approach to sustainability in the culinary arts? Has it influenced your perspective on your future role as a chef or culinary professional?
3. Connecting to Professional Goals
 - Conclude the reflection by identifying one or two ways you might apply these insights in your future career, whether by adopting certain sustainable practices, promoting cultural awareness in your work, or educating others about the value of Indigenous knowledge in food systems.

Criteria	Excellent (90-100%)	Good (80-89%)	Satisfactory (70-79%)	Needs Improvement (60-69%)	Unsatisfactory (<60%)
Depth of Reflection	Insightful and thoughtful reflection, connecting all aspects of the practice with personal goals.	Strong reflection, with some personal insight.	Basic reflection, limited personal connection.	Superficial reflection, lacks depth or relevance.	Lacks reflection on Indigenous food practices.
Understanding of Cultural and Sustainability Aspects	Demonstrates strong understanding of cultural and sustainability significance.	Shows good understanding, minor gaps.	Basic understanding with limited depth.	Minimal understanding, lacks clarity.	No clear understanding of cultural/sustainability relevance.

Application in Culinary Practices	Provides creative, practical applications for modern settings.	Suggests basic applications, though somewhat limited.	Basic ideas for application, lacks detail.	Minimal application suggestions, lacks feasibility.	No practical applications mentioned.
Connection to Professional Goals	Clear, actionable connection to future career goals.	Shows connection to goals with limited detail.	Basic connection to goals, lacks specificity.	Minimal connection to future goals.	No connection to professional goals.

Suggested Readings

- Desmarais, A. A., Wiebe, N., & Wittman, H. (2010). *Food sovereignty: Reconnecting Food, Nature & Community*. Food First Books.
- Mihesuah, D. A., & Hoover, E. (2019). *Indigenous food sovereignty in the United States: Restoring Cultural Knowledge, Protecting Environments, and Regaining Health*. University of Oklahoma Press.
- PBS Origins. (2024, June 25). *Native American Food Sovereignty, explained* [Video]. YouTube. <https://www.youtube.com/watch?v=6LQD90ELcJI>
- Sherman, S. (2017). *The Sioux Chef's Indigenous kitchen*. U of Minnesota Press.
- Wiebe, N., Desmarais, A. A., & Wittman, H. (2011). *Food sovereignty in Canada: Creating Just and Sustainable Food Systems*. Fernwood Publishing.

Module 7 (Capstone Project): Sustainability Audit and Redesign of a Culinary Operation Topics

- Summary of all course concepts with an emphasis on students' ability to assess and evaluate the efficacy of a sustainable culinary operation.
- Designing practical solutions.
- Problem solving.

Learning Objectives

By the end of this project, students will:

1. Analyze existing culinary practices for their environmental impact.
2. Propose evidence-based redesigns to enhance sustainability in sourcing, waste management, and energy use.
3. Reflect on the feasibility and potential impact of sustainable changes in culinary operations.

Key Concepts

- Sustainability Audit: A systematic review of practices that examines resource use, waste generation, and sustainability outcomes.
- Environmental Impact Assessment: Identifying the environmental consequences of culinary practices, from sourcing ingredients to waste disposal.
- Practical Redesign: Creating realistic, implementable strategies that can reduce negative environmental impacts in a culinary setting.

Assignment

Students will conduct a two-part project involving a comprehensive sustainability audit and a subsequent redesign plan. The project will be documented in a detailed report and presented to the class.

1. Sustainability Audit

- Students will choose an existing culinary operation to analyze...
 - ideally **students will choose the restaurant that they did an internship with** concurrently to this course.
 - however, they may also choose to audit another local restaurant, school cafeteria, nursing home, even their home kitchen. Any operation in which they can access the necessary information.
- Data Collection: Conduct an in-depth audit focusing on several key areas:
 - Ingredient Sourcing: Examine where ingredients are sourced, noting aspects such as local vs. imported, organic vs. conventional, and seasonal availability.
 - Waste Management: Document current waste levels, including food waste, packaging waste, and other byproducts.
 - Energy and Resource Use: Assess energy and water use, looking at appliances, heating, cooling, and any other resource-intensive processes.
- Analysis: Students will analyze the collected data to identify areas where sustainability practices can be improved.

2. Redesign Plan

- Propose Improvements: Based on audit findings, students will develop a redesigned plan to address identified issues. This should include:
 - Sourcing Changes: Recommendations for sourcing more sustainable ingredients (e.g., using local, seasonal, or organic produce).
 - Waste Reduction Strategies: Suggestions for minimizing waste, such as implementing composting, recycling, or using nose-to-tail and leaf-to-root cooking methods.
 - Resource Efficiency: Proposals for reducing energy and water use through efficient appliances, behavioral changes, or alternative practices.
- Implementation Feasibility: Assess the feasibility of each proposed change, including potential barriers and costs, to ensure recommendations are realistic and actionable.
- Impact Evaluation: Estimate the potential impact of these changes on the environment, community, and operation's bottom line. Students should provide calculations or qualitative assessments where possible.

3. Presentation

- Presentation: Students will present their findings and redesigned plans to the class in their groups, highlighting the key changes they recommend and the expected outcomes.

4. Reflection

- Students will individually write a reflective essay on the audit and redesign process, discussing the challenges encountered, insights gained, and how this project has impacted their understanding of sustainable culinary practices.

1. Sustainability Audit (20%)

Performance Level	Description
90-100% (Excellent)	Comprehensive data collection with detailed analysis across all areas (sourcing, waste, resources). Demonstrates clear identification of sustainability challenges.

80-89% (Good)	Thorough data collection with strong analysis, though some areas may lack depth. Shows understanding of sustainability issues.
70-79% (Satisfactory)	Sufficient data collected with basic analysis; limited in-depth assessment of issues.
60-69% (Needs Improvement)	Minimal data collection and superficial analysis; lacks clarity in identifying key issues.
Below 60% (Unsatisfactory)	Incomplete data and limited or no analysis; unclear identification of issues.

2. Redesign Plan (30%)

Performance Level	Description
90-100% (Excellent)	Innovative, well-justified redesign that addresses all key areas; highly feasible and supported by impact evaluation.
80-89% (Good)	Solid, relevant suggestions with consideration of feasibility; includes impact analysis but may lack detail.
70-79% (Satisfactory)	Basic redesign with limited innovation; feasibility assessment is vague. Some impact analysis included.
60-69% (Needs Improvement)	Minimal or impractical suggestions; lacks feasibility assessment and impact analysis.
Below 60% (Unsatisfactory)	Incomplete or irrelevant redesign plan, with no consideration of feasibility or impact.

3. Presentation (20%)

Performance Level	Description
90-100% (Excellent)	Clear, engaging, and well-organized presentation; visual aids enhance understanding. Responds thoughtfully to questions.
80-89% (Good)	Organized and clear presentation with effective visuals. Shows confidence in responding to questions.
70-79% (Satisfactory)	Adequately organized, with basic visuals; limited ability to answer questions.
60-69% (Needs Improvement)	Lacks organization and clarity; visuals may be lacking or ineffective.
Below 60% (Unsatisfactory)	Unstructured or unclear presentation; little effort to engage audience or answer questions.

4. Reflection (30%)

Performance Level	Description
90-100% (Excellent)	Thoughtful and insightful, demonstrating clear connections to personal growth and course concepts.
80-89% (Good)	Thoughtful reflection with some connections to personal growth.
70-79% (Satisfactory)	Basic reflection, limited insight, but acknowledges course concepts.
60-69% (Needs Improvement)	Minimal reflection, lacks personal connection to learning outcomes.
Below 60% (Unsatisfactory)	Little or no evidence of one's ability to reflect and grow from course concepts.

Assessment

Assignments and Journals – 60%

Capstone Project – 20%

Participation – 20%

Class participation is essential in discussions, field trips, guest speaker engagements, and contemplative practices. Students are expected to contribute actively, respect diverse viewpoints, and demonstrate growth in their understanding.

Performance Level	Description
90-100% (Excellent)	Regular, insightful contributions in discussions; fully engaged in activities; shows respect and openness to different perspectives. Demonstrates depth in reflections on personal and professional growth.
80-89% (Good)	Consistent contributions in discussions; active in activities; respects others' opinions. Demonstrates reflection on learning and some personal growth.
70-79% (Satisfactory)	Occasional contributions; participates in activities but engagement may lack depth. Shows limited reflection on personal growth.
60-69% (Needs Improvement)	Infrequent contributions or minimal engagement; lacks depth or shows little openness to other perspectives. Minimal personal reflection.
Below 60% (Unsatisfactory)	Rarely participates or is disengaged; lacks respect for others' viewpoints. No evidence of reflection or personal growth.

Reflection

This curriculum represents a forward-thinking approach to culinary education, integrating theoretical learning that challenges preconceived notions with practical learning opportunities that allow students to conceptualize ideas within their own reality. Given the diverse range of careers that one may pursue after a culinary education, it is imperative that students gain a solid foundation in sustainability principles. Additionally, they should develop a skillset that enables them to engage with interdisciplinary actors throughout their careers.

Future applications of this curriculum could include adapting it for more specific audiences, such as different tracks within culinary education like hospitality management, pastry production, event planning, and sommelier programs. It also holds potential for collaborative programs between culinary schools and local community organizations, which could strengthen the connection between a school and its surrounding community.

Developing this curriculum has illuminated the inescapable relationship between culinary arts and sustainability, as well as the importance of educating future chefs on their potential to lead positive change. This project has highlighted that integrating theory with hands-on practice can encourage students to see themselves as agents of change within their communities and beyond. The curriculum effectively blends practical skills with reflective thinking, offering students a comprehensive view of sustainability challenges and solutions.

To further enhance the curriculum's impact, establishing partnerships with local farms, community kitchens, and sustainability-focused organizations could enrich the experiential learning components. Building relationships between a school and its community members is not a simple task, but with each iteration of the curriculum, these connections will allow for a more streamlined and effective learning experience for students. Additionally, incorporating more frequent guest lectures or mentorship opportunities with sustainability advocates would deepen students' connection to the field and provide ongoing professional insights.

Extensions of this curriculum could include developing a truly integrated curriculum that merges the concepts of this course within the current structure of a culinary management program. While this course is effective as a stand-alone offering, integrating it within a broader program could amplify its benefits. Alternatively, this curriculum could evolve into a certification program, offering professionals an opportunity to gain credentials in sustainable culinary practices. The certification program could be structured to provide both foundational and advanced levels of training, accommodating individuals at various stages of their careers. For example, an introductory certification might focus on basic principles of sustainability, including zero-waste practices, ethical sourcing, and community engagement. Meanwhile, an advanced certification could address more strategic applications, such as conducting comprehensive sustainability audits, integrating circular economy principles into large-scale culinary operations, and exploring methods of identifying sustainable suppliers. In addition, the certification could include partnerships with professional organizations, such as hospitality groups, hotel chains or sustainability-focused nonprofits. These collaborations could provide participants with networking opportunities, mentorship, and even internship placements.

This curriculum marks an essential step towards holistically integrating sustainability into culinary education, preparing students to become knowledgeable participants and agents of change within the food system. Through community engagement, reflective practices, and practical applications, it empowers students to become mindful, responsible chefs. This curriculum can serve as a model for culinary programs everywhere, inspiring a new generation of food professionals committed to building sustainable food systems and resilient communities.

References

- Bartels, K. A., & Parker, K. A. (2023). *Teaching Sustainability / Teaching Sustainably*. Taylor & Francis.
- Bertoldo, J., Hsu, R., Reid, T., Righter, A., & Wolfson, J. A. (2022). Attitudes and beliefs about how chefs can promote nutrition and sustainable food systems among students at a US culinary school. *Public health nutrition*, 25(2), 498-510.
- Bowers, C. A. (2001). *Educating for Eco-Justice and community*. <https://ci.nii.ac.jp/ncid/BA55587525>
- Burns, H. (2011). Teaching for transformation: (Re)designing sustainability courses based on ecological principles. *Journal of Sustainability Education*, 2.
- Deutsch, J. (2016). Revolutionizing culinary education: Can cooking save our food system.
- Dewey, J. (1902). *The child and the curriculum*. http://www.sophia-project.org/uploads/1/3/9/5/13955288/dewey_child.pdf
- Ebbini, G. W. (2022). Transformative design pedagogy: Teaching biophilic design through experiential learning. *Journal of Experiential Education*, 45(1), 7-31.
- Franchini, C., Biasini, B., Giopp, F., Rosi, A., & Scazzina, F. (2024). Promoting nutrition and food sustainability knowledge in apprentice chefs: an intervention study at the school of Italian culinary arts—ALMA. *Nutrients*, 16(4), 537.
- Frisk, E., & Larson, K. (2011). Educating for sustainability: Competencies & practices for transformative action. *Journal of Sustainability Education*, 3. <http://www.jsedimensions.org/wordpress/wp-content/uploads/2011/03/FriskLarson2011.pdf>
- Grèzes-Bürcher, S., & Grèzes, V. (2023). Designing a sustainable, circular culinary system. *Circular Economy and Sustainability/Circular Economy and Sustainability*. <https://doi.org/10.1007/s43615-023-00295-w>
- Gruenewald, D. A. (2003). The best of both worlds: A critical pedagogy of place. *Educational Researcher*, 32(4), 3–12. <https://doi.org/10.3102/0013189x032004003>
- Kapelari, S., Alexopoulos, G., Moussouri, T., Sagmeister, K. J., & Stampfer, F. (2020). Food heritage makes a difference: The importance of cultural knowledge for improving education for sustainable food choices. *Sustainability*, 12(4), 1509.
- Kimmerer, R. (2013). *Braiding sweetgrass: Indigenous wisdom, scientific knowledge and the teachings of plants*. Milkweed Editions.
- Kolb, D. A. (2014). *Experiential learning: Experience as the source of learning and development*. FT Press.
- Martusewicz, R. A. (2018). Ecojustice for teacher education policy and practice: The way of love. *Issues in Teacher Education*, 27(2), 17-35.
- McKim, A. J., Raven, M. R., Palmer, A., McFarland, A., & Isleib, J. (2019). Land-based learning: a learning paradigm for building community and sustainable farms. *The Journal of Extension*, 57(5), 19.
- Mezirow, J. (2018). Transformative learning theory. In *Contemporary theories of learning* (pp. 114-128). Routledge.
- Pryshlakivsky, J., & Searcy, C. (2012). Sustainable development as a wicked problem. In *Topics in safety, risk, reliability and quality* (pp. 109–128). https://doi.org/10.1007/978-94-007-5515-4_6
- Purvis, B., Mao, Y., & Robinson, D. (2019). Three pillars of sustainability: in search of conceptual origins. *Sustainability science*, 14, 681-695.

Sumner, J. (2013). Eating as if it really matters: Teaching the pedagogy of food in the age of globalization. *Brock Education*, 22(2). <https://doi.org/10.26522/brocked.v22i2.341>

Thorp, L. (2005). *The Pull of the Earth: Participatory Ethnography in the School Garden*. <http://ci.nii.ac.jp/ncid/BA77258935>