

Reducing Food Waste, Growing Sustainability: Lessons from the Rhode Island School Recycling Project (RISRP)

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ABSTRACT

Food waste offers a powerful, real-world context for advancing K-12 science learning while addressing urgent environmental and equity challenges. This paper examines how food-waste reduction can serve as an anchoring phenomenon aligned with NGSS science and engineering practices, including data analysis, systems thinking, and solution design. Drawing on the Rhode Island School Recycling Project (RISRP), a statewide initiative launched in 2001 and expanded to address organics diversion and food recovery, we describe a two-year, whole-school model that integrates cafeteria routines with classroom instruction. RISRP's *Get Food Smart* program engages students, teachers, administrators, custodial staff, and food service workers in coordinated efforts to reduce, recover, and recycle food waste. Central to the model are student-led waste audits, share tables, composting systems, and data dashboards that position the cafeteria as a living laboratory for authentic scientific inquiry. Program outcomes from participating schools demonstrate measurable reductions in landfill waste, recovery of edible surplus food, and increased student leadership and engagement. We outline stakeholder roles, assessment practices, implementation challenges, safety considerations, and adaptable strategies for diverse educational contexts, including teacher preparation programs. By linking climate mitigation, food insecurity, and science instruction, RISRP illustrates how sustainability education can be embedded into everyday school practices without requiring extensive resources. Food-waste reduction emerges not as an environmental add-on, but as a practical, standards-aligned pathway for cultivating student agency and community resilience.

Keywords: sustainability education, food pedagogy

Food Waste and K-12 Science Education

Integrating food-waste concepts into K-12 science instruction offers a meaningful way to connect core scientific ideas to students' everyday experiences. Food waste sits at the intersection of key NGSS-aligned concepts, including energy flow, ecosystems, climate change, human impacts on Earth systems, and resource management (NGSS Lead States, 2013). Because food waste is generated daily in school cafeterias, it provides a familiar, real-world

context through which students can investigate abstract scientific concepts using authentic data. At the same time, food waste represents a scientifically and socially urgent issue. Discarded food contributes to greenhouse gas emissions, including methane, and requires significant amounts of land, water, energy, and labor to produce. In the United States alone, food waste accounts for approximately 1.9 million metric tons of CO₂e and \$1.7 billion in lost value each year (Adjapong et al., 2024; Elnakib et al., 2024). These impacts make food waste one of the most accessible, high-leverage climate mitigation targets for schools and youth. At the same time, food waste intersects directly with issues of food insecurity. In Rhode Island, approximately 10.6% of residents experience food insecurity, and rates increased sharply during the COVID-19 pandemic (Rabbitt et al., 2024). Nationally, 13.5% of U.S. households, representing 18 million households, were food insecure in 2023, a statistically significant rise from 12.8% in 2022 (Rabbitt et al., 2024). Food-insecure households experience periods during which they lack sufficient resources to provide enough food for all members (Rabbitt et al., 2024). In this context, reducing cafeteria waste and recovering edible surplus food are not only environmental strategies but also equity-oriented responses that can help schools better steward resources. When students analyze cafeteria waste streams, they engage with a complex, real-world problem that connects climate, local ecosystems, community resources, school budgets, and food equity in their school environment.

Research shows that bringing food-waste topics into science instruction can deepen students' understanding of core concepts while also encouraging more sustainable behaviors (Elnakib et al., 2024; Prescott et al., 2019). Food-waste lessons help students explore ideas such as energy flow, ecosystem processes, biogeochemical cycles, and the carbon footprint of food systems through hands-on, relevant investigations (Wang et al., 2025). Studies also indicate that these learning experiences increase students' knowledge of climate change, strengthen their awareness of social norms around waste, and support students' sense of agency and willingness to act (Elnakib et al., 2024; Prescott et al., 2019). Importantly for teachers, these outcomes align closely with NGSS science and engineering practices, including analyzing and interpreting data, constructing explanations, and designing solutions to real-world problems (NGSS Lead States, 2013). In this way, food waste functions as both an anchoring phenomenon and a practical entry point for authentic scientific inquiry.

Food-waste education also leads to concrete benefits beyond the science classroom (Prescott et al., 2019; Sundin et al., 2024). Schools that focus on reducing waste often see improvements in nutrition, particularly through reduced disposal of fruits, vegetables, and milk, while also saving money and supporting equity for food-insecure students (Elnakib et al., 2021). Food packaging alone makes up nearly 42% of school municipal solid waste, underscoring the scale of the problem and the need for coordinated, science-informed approaches (Heiges et al., 2022). For students, these visible changes reinforce a powerful message that science is not just something they do in class, but a tool they can use to improve their schools and communities.

Together, this body of work highlights food-waste education as more than an environmental add-on. It is a powerful lever for teaching foundational scientific principles, cultivating sustainable mindsets and behaviors, and supporting health, equity, and community resilience (Prescott et al., 2019). By engaging with the science of food waste, K-12 students

participate in meaningful, real-world science practices that align with NGSS and empower them to take informed action within their own school environments. For science teacher educators, the Rhode Island School Recycling Project (RISRP) offers a model for preparing future teachers to engage students in place-based, sustainability-focused science learning. The program illustrates how everyday school spaces can function as sites for scientific inquiry and provides examples of instructional routines, data sources, and community partnerships that can be adapted within methods courses and field experiences. This article draws on RISRP's implementation to illustrate how food-waste education can support science learning and to provide teacher educators and classroom teachers with adaptable approaches for connecting students' everyday experiences to scientific inquiry and environmental action.

The Rhode Island School Recycling Project Story

The Rhode Island School Recycling Project (RISRP) was established in 2001 as a collaborative initiative between the Rhode Island Resource Recovery Corporation (RIRRC) and the Rhode Island Department of Environmental Management (RIDEM). The program emerged at a time when recycling infrastructure in Rhode Island's K-12 schools lagged dramatically behind regional expectations, as only 18% of schools were recycling properly, one of the lowest rates in New England (RI School Recycling Project, 2026). State agencies recognized that improving school recycling was essential not only for meeting Rhode Island's waste-management goals but also for cultivating environmental literacy and responsible waste practices among students.

RISRP's early work focused on developing clear recycling systems, building school-level capacity, and providing on-site training for educators, custodial teams, and administrators. By the time the initial program period ended in 2007, Rhode Island's school recycling rate had risen to 68%, demonstrating that coordinated education, support, and policy alignment could rapidly transform school waste practices (RI School Recycling Project, 2026). This early success established RISRP as an effective model for statewide school sustainability programming and revealed how quickly school communities can adopt pro-environmental behaviors when systems and expectations are well supported.

As recycling practices improved and policy attention shifted toward organics diversion, RISRP expanded its focus to address a growing concern in sustainability circles: food waste. In 2019, RISRP conducted 15 food-waste audits across three public school districts, representing elementary, middle, and high schools in urban, suburban, and rural communities (Author Citation, 2019). The goal was to understand the scale and nature of food waste in schools and to identify opportunities for intervention. RISRP estimated that Rhode Island public schools discard approximately 13.8 tons of food every week, totaling nearly 2,500 tons of food annually (Author Citation, 2019). Even more concerning, 388 tons of that waste consisted of unopened or untouched items like fresh fruit, granola bars, yogurt, cheese sticks, and milk. These perfectly edible foods represented both nutritional and financial loss. These results highlighted the urgent need for school-based strategies that reduce waste at the source, recover uneaten food for students in need, and divert remaining organics from the waste stream.

This work unfolded during a broader policy moment in Rhode Island. The state's Central Landfill in Johnston, RI is approaching capacity, prompting legislative and municipal interest in organics diversion, composting infrastructure, and waste-reduction interventions (RI School Recycling Project, 2026). At the same time, food insecurity remains a pressing challenge across the state, particularly for children (RI School Recycling Project, 2026). This intersection of environmental and social need positioned food-waste reduction as both a sustainability priority and a matter of equity.

In response, RISRP redirected its efforts toward supporting schools in reducing, recovering, and recycling food waste, building on its history of effective recycling education. RISRP's core mission is to demonstrate the environmental benefits of reducing, reusing, and recycling in lunchrooms through project-based learning, effectively transforming the school cafeteria into an extension of the science classroom. Today, RISRP works with schools to implement food-share tables, composting systems, waste-audit programs, and educational initiatives that connect cafeteria practices to classroom learning. The evolution of RISRP reflects Rhode Island's shifting environmental priorities, the growing recognition of food waste as a climate and equity issue, and the continued potential for schools to serve as powerful sites of sustainability innovation. As of September 2026, RISRP supports 78 schools statewide, with continued growth across urban, suburban, charter, and private school contexts. Although RISRP is a Rhode Island-based initiative, the challenge of food waste and the opportunity to connect school food systems with science learning are broadly shared. Science teachers and science teacher educators can draw on existing community partnerships in food waste reduction, recycling, composting, food recovery, and agriculture to create place-based science learning opportunities, using local food systems as a context for inquiry while preparing future teachers to recognize and build upon the resources already present in their communities.

The RISRP In-School Model

RISRP's In-School Model, delivered through the *Get Food Smart* program, is a two-year, whole-school approach designed to reduce, recover, and recycle food waste while strengthening recycling practices across the school community. The model is intentionally phased, combining clear launch structures, ongoing data collection, and gradual release of responsibility to support long-term success without overwhelming school staff. The program begins with a structured launch period, typically spanning two weeks, and always starts with principal authorization. During this phase, RISRP meets with school leadership to review the program calendar, identify a *School Champion*, and conduct site visits to observe lunchroom routines. Initial food-waste audits are completed with student involvement before RISRP provides targeted training for custodians, cafeteria staff, and teachers, ensuring that recycling, composting, and share-table procedures are aligned and clearly communicated.

Year One focuses on building reliable systems for responsible waste management. Schools divert food scraps for composting or anaerobic digestion, recover edible surplus food through share tables and food-rescue partnerships, and conduct monthly or bi-monthly waste audits using a shared data dashboard. Students are trained as *Waste Warriors* and are directed to help peers sort correctly, collect data, and reinforce positive norms. These routines are

supported by visual signage and regular check-ins with the School Champion and RISRP staff. Field trips to facilities such as the Central Landfill or composting sites further connect daily cafeteria practices to broader environmental systems.

In Year Two, the emphasis shifts from diversion to prevention. Schools use audit data to identify patterns and implement strategies such as Zero Waste Days, Offer Versus Serve adjustments, taste tests, and student-led communication campaigns. Teachers and students collaborate to plan and lead these events, often integrating them into science, math, or engineering units. Recognition events celebrate student leadership and stakeholder contributions, reinforcing sustainability as a shared school value. Table 1 below summarizes the two-year implementation timeline.

Table 1

RISRP Implementation Timeline

Timeline	Key Activities	Participants
Year 1	• Diverting food scraps for composting/anaerobic digestion • Recovering surplus food via share tables and food-rescue partnerships • Conducting monthly or bi-monthly waste audits with a shared data dashboard • Training peer leaders • Facility field trips	Student Waste Warriors, School Champion, RISRP Staff
Year 2	• Using audit data to identify patterns • Running Zero Waste Days • Offer Versus Serve adjustments • Taste tests • Student-led communication campaigns • Integrating events into science, math, or engineering units • Recognition events for stakeholders	Student Waste Warriors, School Champion, Teachers, School Stakeholders

Across both years, RISRP engages administrators, teachers, custodial staff, cafeteria staff, students, families, and community partners in clearly defined roles. Responsibility gradually shifts from RISRP-led facilitation to school-based leadership, supported by milestone audits and transition meetings. This design allows schools to build capacity at their own pace while maintaining consistency and accountability. Collectively, these practices help schools reduce their environmental impact, strengthen recycling systems, and position the cafeteria as a living laboratory for student learning and leadership.

Stakeholder Roles and Responsibilities

The *Get Food Smart* program is designed around a clear understanding of who must be involved for school-based food-waste reduction to succeed and what motivates each group's participation. The program distinguishes between primary stakeholders, who anchor and sustain the work, and secondary stakeholders, whose collaboration is essential for effective implementation. This structure allows schools to integrate food-waste reduction into existing systems while minimizing added burden on any one group.

Students, principals, and *Food Smart* Champions serve as the program's primary stakeholders. Students are positioned not only as participants but as leaders and problem-solvers. Through roles such as Cafeteria Rangers or Waste Warriors, students take responsibility for monitoring sorting stations, collecting data, and educating peers. These leadership opportunities help students connect daily cafeteria behaviors to larger environmental issues such as climate change and resource conservation, reinforcing the relevance of science learning beyond the classroom.

Principals play a critical role by authorizing participation and aligning the program with school priorities and operational requirements (Napolitano et al., 2023). Because food-waste reduction initiatives affect school operations, facilities management, and compliance with state waste-diversion policies, administrative support is essential for successful implementation. Rhode Island schools are increasingly expected to divert organic waste from landfills, and programs such as *Get Food Smart* require coordination across multiple departments, including facilities, food service, and instruction. Principals help facilitate this coordination, allocate resources and time for implementation, and ensure that sustainability initiatives align with broader school and district goals.

"*Food Smart* Champions", typically teachers, instructional staff, or school leaders, oversee day-to-day implementation from within the school. RISRP's "high-touch" support model is intentionally designed to reduce the workload placed on these individuals. RISRP manages project logistics during the launch phase, coordinates training and audits, and continues to provide hands-on, student-centered activities such as compost delivery events, school garden installations, and Zero Waste Days. This ongoing support helps sustain momentum, keeps the program visible and relevant, and allows *Food Smart* Champions to focus on building relationships and consistency rather than managing operational details.

A broader group of secondary stakeholders supports implementation and long-term success. Custodians, cafeteria staff, and food service workers help maintain sorting stations, manage material flow, and identify operational challenges or opportunities for waste reduction. At the district level, superintendents, directors of facilities, and chief financial officers play an important role in supporting scaling and sustainability by aligning the program with district operations and budget considerations. Together, these stakeholders create the conditions necessary for food-waste reduction to function not as a stand-alone initiative, but as an embedded, sustainable practice within the life of the school.

Assessment in the RISRP Model

Assessment within the RISRP model is grounded in the idea that solving a problem is difficult without first understanding it. For this reason, waste audits serve as the central assessment tool, functioning simultaneously as a diagnostic measure, a learning activity, and a way to document change over time. Rather than relying on traditional tests, RISRP emphasizes assessment practices that are observable, data-driven, and embedded in authentic school contexts. These approaches support both student learning and program decision-making while reinforcing the role of science as a tool for understanding and improving real-world systems.

Instruction typically begins with pre-assessment through waste audits and classroom discussions that elicit students' initial ideas about food waste and human impacts. Before any waste-reduction strategies are introduced, students participate in a baseline audit that measures the amount, types, and sources of waste generated in the cafeteria. Food waste is examined across multiple stages, including pre-consumer kitchen waste, waste generated along the serving line, and post-consumer plate waste. Teachers use informal conversations, prediction activities, concept maps, or quick writes to surface student assumptions about where waste comes from, what happens to it, and which foods are wasted most. Establishing this baseline helps students see the problem clearly while providing schools with data to guide next steps.

During implementation, formative assessment is ongoing and highly visible. Waste audits require students to sort materials into categories such as recoverable food, liquids, recycling, food scraps, and landfill trash, depending on the school's composting and recovery systems. Students measure waste by weight, count recoverable items such as unopened milk or whole fruit, and document findings using audit logs, shared spreadsheets, dashboards, or photographs. These data-collection practices reinforce key science and math skills, including measurement, data analysis, and pattern recognition. For science teacher educators, waste audits provide a useful model of phenomenon-based assessment. Methods instructors can engage pre-service teachers in analyzing archived audit data, designing student investigations, and developing formative assessment strategies grounded in authentic environmental problems.

In classrooms, students analyze audit data in science notebooks or journals, reflect on trends over time, and connect their findings to concepts such as decomposition, energy flow, and greenhouse gas emissions. Students use cafeteria data to explain patterns in waste generation and evaluate the effectiveness of interventions. For teachers and teacher educators, waste audits can also reveal progression in students' conceptual understanding, not just changes in sorting behavior. Early in an investigation, students often focus on visible actions like, "people throw away food because they don't want it". As learning develops, teachers can look for increasingly sophisticated explanations that connect waste to larger systems, such as decomposition, methane production, resource use, transportation, and food production. Evidence of growth may include students moving from simple observations like "fruit is wasted a lot" to evidence-based explanations like "fruit is frequently wasted because students receive it automatically at lunch, which increases the amount of uneaten produce entering the waste

stream”. Teachers can also watch for students using data to support claims, recognizing patterns over time, identifying multiple causes for waste, and proposing solutions that consider trade-offs rather than single-step fixes. These shifts indicate developing systems thinking and scientific reasoning aligned with NGSS practices of analyzing and interpreting data, constructing explanations, and designing solutions. Collectively, RISRP’s assessment practices reinforce the idea that learning about food waste is both a scientific and civic endeavor, positioning students as capable investigators whose data and decisions contribute meaningfully to their school communities.

Classroom Testimony

Webster Avenue Elementary School in Providence, Rhode Island, is using RISRP’s *Get Food Smart* program to help students understand the importance of reducing wasted food through hands-on, data-driven learning (CET, 2025a). After watching RISRP conduct a cafeteria food-waste audit, fifth-grade teacher Stephanie Rioux involved her students in the process, where they collaborated with custodial staff and used luggage scales and audit logs to measure food scraps, recyclables, liquids, and trash. RISRP later presented combined audit results in class, helping students calculate total waste reductions and connect their daily actions to broader climate issues through tools like a NASA KIDS greenhouse-effect video (NASA, 2025). Students reflected on their learning with comments showing pride and increased awareness of environmental impact. Regular audits have become a meaningful way for students to apply science and math concepts, understand methane emissions from landfills, and see how cafeteria habits contribute to sustainability. With a schoolwide goal to reduce wasted food by 50% by 2030, Webster Avenue is building a culture of environmental stewardship supported by teachers, custodians, RISRP, and enthusiastic student leaders (CET, 2025a). Webster Avenue’s experience highlights how food-waste investigations can deepen students’ scientific understanding and strengthen connections between classroom learning and everyday behaviors.

When these learning opportunities are paired with sustained schoolwide participation and student leadership, the impact can extend beyond individual classrooms to transform school culture and environmental outcomes. For example, William D’Abate Elementary School sparked a schoolwide movement that has transformed both student learning and environmental impact. Through RISRP’s *Get Food Smart* program, students and staff have built one of Rhode Island’s most successful food-waste prevention models. In just a few months, the school diverted 8.6 tons of food from the landfill, recovered 3,240 pounds of edible items for students and families, and reduced its carbon footprint by 12 metric tons of CO₂ (CET, 2025b). More than 50 “Food Waste Warriors” now volunteer in the cafeteria, helping peers sort waste, explaining why the work matters, and taking pride in being part of a climate-solution team. Teachers have woven the program into authentic science and math lessons, while custodial staff, administrators, and food service workers have collaborated to make sorting systems (Figure 1) efficient and sustainable. As Principal Brent Kerman notes, “The benefits to the students and school are tremendous. Many teachers have generated authentic Science and Math projects around this work. It has been fantastic for our students and school as a whole (CET, 2025b).”

Figure 1

RISRP Sorting Station



The school's momentum was celebrated at an assembly where Student Waste Warriors, teachers, custodians, and cafeteria staff were honored for their achievements. Co-hosted by Art Teacher Kira Melville and Librarian Marissa Salvas, the event brought together state leaders, including representatives from the Governor's office, to recognize the school's impact on sustainability and food security. While the ceremony highlighted impressive achievements, it also reinforced a deeper message: hands-on, community-driven learning can empower students to care for the planet and envision a more sustainable future. With food waste already reduced by 11% and a goal of 50% by 2030, William D'Abate Elementary continues to demonstrate what is possible when a school embraces environmental stewardship as part of everyday learning (CET, 2025b).

Practical Strategies for Teachers & Teacher Educators

While large-scale initiatives like the Rhode Island School Recycling Project (RISRP) demonstrate what is possible when schools receive grant funding and external support, meaningful food-waste education does not require participation in a statewide program or additional financial resources. Classroom teachers and teacher educators can adopt many of the same principles on a smaller scale, embedding sustainability into everyday instruction and modeling practices that pre-service teachers can carry into their future classrooms. The strategies below are drawn from core components of RISRP's work and are intentionally designed to be feasible, adaptable, and respectful of school-level constraints.

Using Cafeteria Data as an Anchor Phenomenon. RISRP centers food waste as a phenomenon that students encounter every day. Grounding instruction in data drawn from students' own local environment, rather than abstract or distinct examples, is a well-established strategy for building authentic, evidence-based science investigations (Semken et al., 2017). Classroom teachers can collect simple data such as counts of unopened food items, estimates of food discarded during lunch, or results from a one-day waste audit. These data can serve as entry points for investigations of decomposition, ecosystems, energy flow, climate change, or resource management. Teacher educators can model this practice by providing pre-service teachers with archived or simulated cafeteria datasets. For example, methods students might analyze monthly food-waste audit data, identify trends, construct explanations for observed patterns, and design instructional sequences that engage elementary or secondary students in similar investigations. These activities have the capacity to position future teachers as both learners and curriculum designers.

Modeling Waste Audits as Scientific Investigations. Waste audits are among RISRP's most powerful instructional tools because they combine data collection, systems thinking, and problem-solving. Waste audits are increasingly recognized in the literature as a legitimate data-collection method for studying school waste, alongside surveys, interviews, and observational approaches (Heiges et al., 2022). Classroom teachers can conduct simplified audits using lunchroom observations, photographs, or categorized counts of waste materials. In teacher preparation programs, instructors can simulate a waste audit using sample cafeteria waste data or artifacts collected from local schools. Pre-service teachers can practice generating research questions, developing data-collection protocols, interpreting findings, and discussing how student investigations might be adapted across grade levels. This experience can help future teachers understand how authentic environmental phenomena can support NGSS science and engineering practices.

Connect Sustainability to Existing Curriculum and Field Experiences. Rather than treating food waste as an additional unit, RISRP demonstrates how sustainability concepts can be embedded within existing science instruction. Research on sustainability education consistently finds that embedding sustainability concepts within existing subject-area instruction, rather than treating it as an add-on unit, produces more durable and coherent learning outcomes (Stevenson et al., 2017). Teachers can integrate food-waste investigations into units on ecosystems, matter cycling, human impacts on Earth systems, engineering design, or local environmental issues. Teacher educators can extend this work through methods-course assignments and field experiences. For example, pre-service teachers might design a standards-aligned lesson using cafeteria data, conduct observations of school lunchroom systems during practicum placements, or develop action plans for implementing a small-scale waste audit in their future classrooms. These experiences allow future teachers to see sustainability as an instructional lens rather than an add-on topic.

Build Partnerships Across School Communities. A key lesson from RISRP is that food-waste reduction depends on collaboration among students, teachers, custodians, cafeteria staff, administrators, and community partners; this reflects broader research showing that effective school sustainability initiatives rely on partnership between teachers, leadership, and

often-overlooked staff such as cafeteria and catering workers, whose direct knowledge of food systems is essential to meaningful change (Sabet et al., 2025). Teachers can strengthen classroom learning by incorporating these stakeholders' perspectives into investigations and problem-solving activities. Similarly, teacher educators can help pre-service teachers recognize schools as complex systems by encouraging them to conduct interviews with custodial staff, cafeteria workers, or sustainability coordinators during field placements. These experiences can broaden candidates' understanding of how science learning extends beyond the classroom and is embedded within larger community and environmental systems.

Together, these strategies demonstrate that sustainability education does not require extensive funding or formal programs. By modeling collaboration, data-driven inquiry, and reflective practice, both classroom teachers and teacher educators can cultivate sustainable habits and prepare students and future teachers to see environmental stewardship as an integral part of teaching and learning.

Challenges, Unexpected Results, and Management Tips

Implementing food-waste reduction programming in schools can be complex and is rarely linear. Experiences from the RISRP program highlight common challenges and unexpected outcomes that often arise when students and staff engage deeply with the work. Anticipating these dynamics can help instructors and school teams manage implementation more effectively. These implementation challenges also provide valuable opportunities for science teacher preparation. Rather than presenting sustainability initiatives as seamless successes, teacher educators can use examples from RISRP to help pre-service teachers anticipate logistical constraints and adapt instruction to local conditions.

Student contamination of bins. One of the most frequent challenges is contamination in recycling or compost bins, particularly during early implementation. This often reflects unclear signage or inconsistent expectations rather than student disengagement. Effective responses include simplifying sorting categories, using visual cues with physical examples, assigning student monitors during lunch periods, and reframing mistakes as learning opportunities rather than errors.

Routing or space issues. Limited cafeteria space, inefficient traffic flow, or inconveniently placed bins can disrupt routines and cause frustration for staff and students. Small adjustments such as repositioning stations, reducing the number of bins, or staggering dismissal can significantly improve participation. Collaboration with custodial and cafeteria staff is essential for identifying workable solutions within existing constraints.

Inconsistent cafeteria participation. Variation in staff schedules, training, or comfort with new routines can lead to uneven implementation. Ongoing communication and recognition of cafeteria staff contributions help reinforce consistency and reiterate how valuable their role is.

Despite the challenges, RISRP schools frequently report positive outcomes that extend beyond initial goals. Many schools observe high levels of student excitement, particularly when

students are trusted with responsibility and real data. What begins as a cafeteria routine often becomes a source of pride and identity. Programs often create unexpected leadership opportunities, such as Food Waste Warriors or peer educators, allowing students who may not typically seek leadership roles to contribute meaningfully. Teachers and families report that students bring waste-reduction practices home, influencing family conversations about food, composting, and sustainability, extending the impact beyond school walls. Engagement with food-waste programming frequently sparks instructional creativity. Teachers develop new science, math, and engineering activities grounded in cafeteria data, adapting lessons to their students' interests and school contexts. Taken together, these experiences suggest that successful implementation depends less on perfection and more on adaptability and collaboration. Starting small and celebrating incremental progress help schools sustain momentum while building a culture of shared responsibility. When framed as an evolving learning process rather than a fixed program, food-waste reduction becomes both manageable and transformative.

Safety Considerations

Food-waste reduction activities in school settings require clear safety protocols to protect students and staff while maintaining hygienic learning environments. Within the RISRP model, all activities are designed to align with school health guidelines and to minimize direct contact with waste materials. Students do not directly handle loose food waste. When participating in audits or sorting activities, students use gloves as appropriate and rely on sealed bags or containers rather than exposed materials. Clear visual signage and explicit instructions guide students in proper sorting to prevent contamination and reduce risk. Teachers and staff review expectations prior to student involvement and model safe behaviors. Custodial staff oversee waste removal and ensure compliance with school sanitation standards. No food is stored in classrooms, and audits occur within designated cafeteria or waste-management spaces. Additionally, guidance for younger versus older students can be scaffolded accordingly. Younger students primarily participate through observation, counting, and discussion, while older students may assist with weighing sealed bags and data analysis. Roles are clearly defined to ensure safety while supporting student engagement and leadership.

Conclusion

The Rhode Island School Recycling Project (RISRP) illustrates how food-waste reduction can function as a practical and powerful entry point for sustainability education in K-12 schools. By intentionally linking cafeteria routines with classroom instruction, RISRP transforms an everyday school experience into an authentic context for learning about systems, data, and human impacts on the environment. This approach aligns with and extends a growing body of place-based science education research showing that grounding instruction in students' own local environment produces more authentic, evidence-based investigations (Semken et al., 2017). RISRP demonstrates this when the "local environment" is the cafeteria itself and when the anchoring data maps directly onto NGSS science and engineering practices such as analyzing data, constructing explanations, and designing solutions. The program demonstrates that food waste is not only an environmental challenge but also a meaningful instructional

resource that supports interdisciplinary science learning and fosters student agency and civic responsibility. Just as importantly, RISRP shows how collaboration among teachers, cafeteria staff, custodians, administrators, and community partners can strengthen school culture and sustain long-term change (Sabet et al., 2025).

Several key takeaways emerge for teachers and teacher educators. Effective sustainability education does not require extensive funding or participation in large-scale initiatives, a finding consistent with literature showing that waste audits function as a legitimate, replicable data-collection method for classroom investigation (Heiges et al., 2022). Integrating food-waste concepts into existing science units, elevating student leadership roles, and framing waste reduction as a shared, schoolwide problem-solving effort allow educators to align sustainability work with standards while remaining responsive to local constraints (Stevenson et al., 2017). Teacher educators are uniquely positioned to help future teachers view cafeterias, school grounds, and other everyday spaces as sites for scientific inquiry. By incorporating sustainability-focused investigations into methods coursework and field experiences, teacher educators can prepare pre-service teachers to leverage local phenomena, community partnerships, and authentic datasets in ways that support both science learning and environmental stewardship.

Ongoing research with the Rhode Island School Recycling Project focuses on understanding how educators and other stakeholders experience RISRP implementation and on identifying the types of professional learning and accessible classroom tools that support sustained engagement. Developing ready-to-use, standards-aligned resources will be essential for scaling sustainability education beyond individual schools and grant-funded initiatives. Together, these efforts point toward a future in which food-waste reduction is not a stand-alone program, but an embedded component of science teaching, school culture, and student leadership in building more sustainable communities.

References

- Adjapong, E. S., Bender, K. E., Schaefer, S., & Roe, B. E. (2024). School and meal characteristics associated with plate waste in K-12 cafeterias in the United States. *PloS One*, 19(12), e0299043. <https://doi.org/10.1371/journal.pone.0299043>
- Corwin, Jim. (2019). RISRC Assessment of Wasted Food in RI Public Schools. <https://rireyclingclub.org/wp-content/uploads/2025/08/RISRC-Assessment-of-Wasted-Food-in-RI-Public-Schools.pdf>
- CET. (2025a). *Measuring The Impact: How Wasted Food Audits Are Inspiring Students At Webster Avenue Elementary*. <https://www.cetonline.org/webster-ave-spotlight/>
- CET. (2025b). *Get Food Smart, Stay Food Smart: Sustainability at William D'Abate Elementary*. <https://www.cetonline.org/william-dabate-school-spotlight-2/>
- Elnakib, S. A., Quick, V., Mendez, M., Downs, S., Wackowski, O. A., & Robson, M. G. (2021). Food Waste in Schools: A Pre-/Post-test Study Design Examining the Impact of a Food

- Service Training Intervention to Reduce Food Waste. *International Journal of Environmental Research and Public Health*, 18(12), 6389.
<https://doi.org/10.3390/ijerph18126389>
- Elnakib, S., Subhit, S., Shukaitis, J., Rowe, A., Cava, J., & Quick, V. (2024). New Jersey Leaves No Bite Behind: A Climate Change and Food Waste Curriculum Intervention for Adolescents in the United States. *International Journal of Environmental Research and Public Health*, 21(4), 437. <https://doi.org/10.3390/ijerph21040437>
- Heiges, J., Lee, D. L., Vollmer, L., Wobbekind, K., Thompson, H. R., Gosliner, W., Madsen, K. A., O'Neill, K., & Ritchie, L. D. (2022). Evaluating Food Packaging Waste in Schools: A Systematic Literature Review. *International Journal of Environmental Research and Public Health*, 19(9), 5607. <https://doi.org/10.3390/ijerph19095607>
- NASA. (2025). *What is the greenhouse effect?* - NASA Science. NASA.
<https://science.nasa.gov/kids/earth/what-is-the-greenhouse-effect/>
- Napolitano, K., Gunning, A. M., Marrero, M. E., & Nitecki, E. (2023). Developing and sustaining elementary STEM teacher leadership identities. *Global Education Review*, 10(4), 37-55.
<https://par.nsf.gov/servlets/purl/10525044>
- NGSS Lead States. 2013. *Next Generation Science Standards: For States, By States*. Washington, DC: The National Academies Press. <https://www.nextgenscience.org/>
- Prescott, M. P., Burg, X., Metcalfe, J. J., Lipka, A. E., Herritt, C., & Cunningham-Sabo, L. (2019). Healthy Planet, Healthy Youth: A Food Systems Education and Promotion Intervention to Improve Adolescent Diet Quality and Reduce Food Waste. *Nutrients*, 11(8), 1869.
<https://doi.org/10.3390/nu1108186>
- Rabbitt, M. P., Reed-Jones, M., Hales, L. J., & Burke, M. P. (2024). Household food security in the United States in 2023 (Report No. ERR-337). U.S. Department of Agriculture, Economic Research Service.
<https://ers.usda.gov/sites/default/files/laserfiche/publications/109896/ERR-337.pdf>
- RI School Recycling Project. (2026). *Let's Get Food Smart, RI*. <https://rireyclingclub.org/>
- Sabet, F., & Böhm, S. (2025). Towards sustainable school food: An experiential planetary health framework integrating meals and food education. *British Educational Research Journal*, 51(2), 826-847. <https://doi.org/10.1002/berj.4100>
- Semken, S., Ward, E. G., Moosavi, S., & Chinn, P. W. (2017). Place-based education in geoscience: Theory, research, practice, and assessment. *Journal of Geoscience Education*, 65(4), 542-562. <https://doi.org/10.5408/17-276.1>

- Stevenson, R. B., Lasen, M., Ferreira, J. A., & Davis, J. (2017). Approaches to embedding sustainability in teacher education: A synthesis of the literature. *Teaching and Teacher Education*, 63(1), 405-417. <https://doi.org/10.1016/j.tate.2017.01.013>
- Sundin, N., Malefors, C., Strotmann, C., Orth, D., Kaltenbrunner, K., Obersteiner, G., Scherhaufer, S., Sjölund, A., Persson Osowski, C., Strid, I., & Eriksson, M. (2024). Sustainability assessment of educational approaches as food waste prevention measures in school catering. *Journal of Cleaner Production*, 481, 144196. <https://doi.org/10.1016/j.jclepro.2024.144196>
- Wang, H.-H., Knobloch, N. A., Nelson, B. J., & Thies, S. L. J. (2025). Exploring a Co-Teaching Model to Teach Energy and Food Systems in STEM Integration Through the Lens of Pedagogical Content Knowledge. *Education Sciences*, 15(3), 318. <https://doi.org/10.3390/educsci15030318>