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Original Research Article

Operationalizing sustainable food systems through food programs in elementary schools

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Abstract

Healthy eating supports optimal growth, development, and academic achievement. Yet, the diet quality of school-aged children is poor. Food insecurity and chronic disease are concerns, as are unsustainable agricultural practices. Sustainable food systems have a low environmental impact and can address both dietary and sustainability concerns. This multi-case study was conducted in two Community Schools in a mid-sized Canadian city. Data was collected through interviews, observations, a checklist, and curriculum and policy review. The purpose of this study was to understand the capacity of local elementary schools to implement sustainable food systems strategies in curriculum, policy, and practice. Teachers were doing some cooking and gardening with students, and schools were doing some recycling. There were no specific food policies. Infrastructure challenges varied by school. Insufficient funding and curriculum resources were seen as barriers to implementing sustainable food systems. Staff characteristics and relationships were seen as facilitators.

Schools can be positioned to be strong leaders in the area of school food by prioritizing food literacy and sustainable food system strategies and developing supportive policies, including community members and students in programming, and including experiential food production opportunities for all students.

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Résumé

Une alimentation saine favorise une croissance, un développement et un rendement scolaire optimaux. Pourtant, la qualité de l'alimentation des enfants d'âge scolaire est faible. L'insécurité alimentaire et les maladies chroniques sont également préoccupantes, tout comme le sont les pratiques agricoles non durables. Les systèmes alimentaires durables ont un faible impact sur l'environnement et peuvent répondre à la fois aux préoccupations alimentaires et à celles en lien avec la durabilité. Cette étude de cas multiples a été menée dans deux écoles communautaires d'une ville canadienne de taille moyenne. Les données ont été recueillies au moyen d'entrevues, d'observations, d'une liste de contrôle et d'un examen des curriculums et des politiques. Le but de cette étude était de comprendre la capacité des écoles primaires locales à mettre en œuvre des stratégies de systèmes alimentaires durables dans leur curriculum, leurs politiques et leurs pratiques. Les enseignants faisaient de la cuisine et du jardinage avec les élèves, et les écoles faisaient du recyclage. Aucune politique alimentaire spécifique n'était mise en place. Les défis en matière d'infrastructure variaient selon l'école. Un financement insuffisant et un manque de ressources liées au curriculum étaient perçus comme des obstacles à la mise en œuvre de systèmes alimentaires durables. Les caractéristiques du personnel et les relations entre eux étaient perçues comme des facteurs facilitants. Les écoles peuvent être des chefs de file importants dans le domaine de l'alimentation scolaire en priorisant la littératie alimentaire et des stratégies de systèmes alimentaires durables, en élaborant des politiques de soutien, en incluant les membres de la communauté et les élèves dans la programmation, et en créant des occasions de production alimentaire expérientielle pour tous les élèves.

Keywords: Sustainable food system; school food; school meal program; food literacy; lunch program; snack program; policy

Introduction

Agriculture is one of the most significant contributors to climate change, through greenhouse gas emissions, biodiversity loss, and freshwater use, compromising our future ability to produce food (Willet et al., 2019). At the same time, unhealthy diets contribute significantly to morbidity and mortality worldwide (Willet et al., 2019). There is a direct connection between food, human health, and environmental health. A comprehensive approach to sustainable ways of eating is necessary to promote environmental and human health (Willet et al., 2019). Achieving sustainable eating requires a food system change.

A sustainable food systems (SFS) approach recognizes that the health of humans depends on healthy ecosystems (Loring et al., 2016). SFSs have low environmental impact and protect and respect biodiversity while ensuring nutritional adequacy and food security (FAO, 2012). Food should be accessible, affordable, culturally acceptable, and economically fair, and it should be produced in a way that considers both present and future generations (FAO, 2012). SFS strategies can increase the efficiency of our current food systems, improve health, decrease food system environmental impact, and mitigate impacts on climate

change while supporting the local economy (Rojas et al., 2011).

Schools are an effective place to address system change. Exposing young people to SFS strategies can impact their long-term health by promoting healthy practices and changing our food culture (Rojas et al., 2011). Several initiatives can be implemented in a school setting to improve nutritional intake while promoting food system sustainability: programs that involve growing gardens and fruit trees, composting systems, food programs that offer local foods, and initiatives that reduce the environmental impact of food production (Rojas et al., 2011). The curriculum can support these strategies by incorporating experiential learning components and addressing the impact of the conventional food system on greenhouse gas emissions and climate change (Rojas et al., 2011). Developing relationships between schools and local producers and incorporating local foods into classrooms can increase consumers' understandings of and connections to food (Rojas et al., 2011). Tailoring SFS strategies to fit a school context may include various components.

School food programs in high-income countries were initially set up between 1850 and 1950 to address hunger and focused on providing calories without considering food quality (Oostindjer et al., 2017). Starting around 1970, some schools shifted from addressing hunger to encouraging healthier, more nutrient-dense, lower-calorie foods in response to concerns about poor dietary quality (Oostindjer et al., 2017). The next phase of school food programs involves integrating health and environmental sustainability concerns more closely (Oostindjer et al., 2017). For the most part, Canadian school food programs are in the second phase and have not integrated health with environmental concerns (Everitt et al., 2020a). Understanding the current status, barriers, facilitators, and opportunities associated with incorporating health and environmental sustainability into school food programs will assist with future planning to move towards this goal.

Background

Schools are strategic settings with multiple avenues to address healthy food, food literacy, food security, and food system sustainability through curriculum, policy, and practice (Rojas et al., 2011). We explore these components below and set the stage of the Canadian context for SFS in school food programs.

Healthy food

Healthy eating is vital for optimal growth, development, and academic achievement (Faught et al., 2016; Roustit et al., 2010). However, the diet quality of school-aged children during the school day is poor (Everitt et al., 2020b; Tugault-Lafleur et al., 2017). Fewer than half of Canadian children aged 12 to 19 years consume five or more servings of vegetables and fruit daily (Statistics Canada), and almost one quarter of calories in the diets of nine to 18 year-olds come from minimally nutritious foods (Office of Nutrition Policy and Promotion, 2007). The typical Canadian child's diet (aged two to 18 years) contains 55% calories from minimally nutritious, ultra-processed foods high in salt, sugar, and fats (Moubarac et al., 2014, 2017). Furthermore, 16% of Canadian children experience food insecurity (Tarasuk and Fafard St-Germain, 2022). Additionally, food processing (Schmidt Rivera et al.,

2014) and food packaging (Reisch et al., 2013) contribute to environmental degradation.

Food literacy

According to Cullen et al. (2015), food literacy is understanding food and includes food skills and practices across the lifespan, supporting navigation, engagement, and participation within a complex food system. Food literacy is the ability to make decisions to support personal health and an SFS considering environmental, social, economic, cultural, and political components (Cullen et al., 2015). Within a school setting, teachers can address food literacy and meet curricular outcomes by including cooking, gardening, and composting within the curriculum, and the school can incorporate a recycling program, minimize waste and packaging, procure local foods, and respect cultural diversity (Black et al., 2015; Rauzon et al., 2010; Rojas et al., 2016). Addressing food and sustainability literacy in the school setting improves health and educational outcomes and is necessary to drive social change towards food system sustainability while addressing food security (Rojas et al., 2011). Most countries are beginning to incorporate SFS strategies into schools while addressing the nutritional quality of diets and ameliorating hunger (Oostindjer et al., 2017).

Food security

Food security has been defined in several ways. The Food and Agriculture Organization of the United Nations (FAO, 2006) identifies people as food secure when consistent physical and economic access to sufficient safe, nutritious food meets dietary needs and preferences for an active and healthy life (FAO, 2006). Community food security is "... a situation in which all community residents obtain a safe, culturally acceptable, nutritionally adequate diet through a sustainable food system that maximizes community self-reliance and social justice" (Hamm & Bellows, 2003, p. 37). Both types of food security are essential for school children's healthy growth and development. Community food security includes an SFS, which is critical to consider as we interweave environmental sustainability into school food programs.

Food system sustainability

Sustainable food system strategies are food production practices that protect natural resources and support healthy ecosystems (Tagtow et al., 2014). In the school context, Everitt et al. (2020a) identify the social determinants of health, systems and sustainability, and economic sustainability as essential factors in incorporating SFSs into schools. Determinants of health include diet quality, food literacy, and promotion of health equity and cultural diversity, all done in a non-stigmatizing way. The sustainability aspect looks to conserve and protect the natural environment, which could be done by incorporating local foods, reducing waste, including garden initiatives, and composting. For example, increasing connectedness between farmers and students and promoting local foods through non-traditional supply chains have been accomplished through farm-to-school programs (Powell & Wittman, 2018). Economic sustainability refers to school food and sustainability initiatives having sufficient, secure funding to adequately staff programs and pay workers a living wage. Sufficient and ongoing program support enables programs to build capacity and skill levels while adequately monitoring and evaluating the program.

Curriculum, policy, and practice

School food and sustainability interventions that target curriculum, policy, and practice can impact diet quality, food security, food literacy, and food system sustainability. Incorporating food into existing curricula can enhance the teaching of many subjects. Strategies include teaching practical life skills such as cooking, growing, and composting, teaching math through ratios and fractions found in recipes, and using food as the topic of writing, art, and history (Rojas et al., 2016). Physical education can include gardening and community service, while science can cover topics such as cycles of growth, predator-prey relations, pollination, microorganisms, decomposition, botany, and the carbon cycle (Blair, 2009; Rojas et al., 2016).

Supportive policies at the provincial, school, or district level can promote locally and sustainably produced and locally processed foods and reduce the environmental impact of foods (Rojas et al., 2011). Supportive policies and practices encourage serving minimally processed foods, using less packaging, reducing single-serve packages, purchasing in bulk, and composting and recycling. Table 1 provides an example of curriculum, policy, and practice activities.

Table 1: Incorporating sustainable food systems

Curriculum	**Policy**	**Practice**
Increasing food knowledge Incorporating food into the curriculum	School food policy School sustainability policies: minimally processed, locally sourced, less packaging and single-serve packages, condiments in bulk, reusable dishes	Healthy food choices through universal school food programs (milk program, farm-to-school, breakfast, lunch, food fundraisers, special school days) Helping those that may not have enough to eat Including culturally diverse foods Incorporating local foods Reducing waste Gardening Promoting connectedness to food or the natural environment Composting Including minimally processed, locally grown, organic, seasonal, vegetarian foods Recycling Having environmental sustainability events Reducing GHG emissions and negative environmental impact Having a food garden maintenance and management plan Having sufficient resources to staff programs Building capacity Monitoring and evaluating programs

Canadian context

In Canada, provinces determine education standards and curriculum for kindergarten through to grade 12. For example, in Saskatchewan, the Ministry of Education is responsible for developing the curriculum and determining the outcomes for each grade (Ministry of Education, n.d.). Since 1980, the Saskatchewan Department of Education has designated certain schools in core neighbourhoods as Community Schools to better address poverty and community needs in neighbourhoods with large Indigenous and, more recently, newcomer populations (Saskatchewan Association for Community Education, n.d.). Community Schools' work was so valuable that it was recommended that all public schools in Saskatchewan adopt the Community School Philosophy; however, funding was not allocated to support this recommendation (Saskatchewan Instructional Development & Research Unit, 2001).

Some Community Schools follow the Comprehensive School Community Health framework to assist in planning integrated, holistic health promotion strategies (Government of Saskatchewan, n.d.) and are recognized as such in the health curriculum (Ministry of Education, n.d.). This framework has four components: family and community engagement, high-quality teaching and learning, practical policy, and promotion of healthy physical and social environments (Government of Saskatchewan, n.d.). Schools following this philosophy support the well-being of students, their families, staff, and the community (Government of Saskatchewan, n.d.). Information is available to support schools using the Comprehensive School Community Health philosophy; however, compliance with the recommendations is voluntary.

Like the Comprehensive School Community Health framework, many provinces have developed nutrition frameworks such as the Saskatchewan guidelines, "Nourishing Minds: Eat Well, Learn Well, Live Well" (Saskatchewan Ministry of Education, 2012). However, providing nutrition guidelines does not ensure that they will be followed or that foods brought from home will be healthy. There is little research on food brought from home to school in Canada (Taylor et al., 2012), yet studies from other countries have shown that food from home is not as healthy as what is provided in schools (Caruso & Cullen, 2013; Evans et al., 2010; Hubbard et al., 2014; Hur et al., 2011; Johnston et al., 2012; Stevens & Nelson, 2011). Existing frameworks and guidelines are provincially determined and are therefore not consistent across Canadian school systems, as there is no national policy or strategy. The purpose of this research was to understand the capacity of two local elementary schools to implement SFS strategies in curriculum, policy, and practice.

Methodology

This case study is exploratory and seeks to determine current practices, barriers, facilitators, and opportunities for adopting curriculum-integrated SFS strategies. The findings will be used to document the baseline status of challenges facing schools, inform future intervention research, and provide insights to inform the development of a national school food program.

A case study approach is often used to gain an in-depth understanding of the complexity of a real-life

situation (Creswell, 2014; Creswell & Poth, 2018; Stake, 2006; Taylor & Francis, 2013; Yin, 2014). Case studies can integrate many types of data sources, including interviews, observations, and documents, and may contain both qualitative and quantitative data (Yin, 2014). Data are generated from multiple sources to allow convergence through triangulation (Taylor & Francis, 2013; Yin, 2014). Multiple-case studies contain more than one case, provide more evidence, and are robust (Yin, 2014). A study containing two cases can therefore provide more complete data than a single case study design (Yin, 2014).

The school division selected two sites from eight possible schools. The two schools chosen had meal programs in place, feeding 25-40% of the children in the school, and, therefore, had the infrastructure to prepare food. The justification used by the school division for selecting these schools was that they believed these schools would be good candidates for future school food interventions.

We used multiple data sources**:** interviews, curriculum review, policy review, observations, and the adapted School Food Environment Assessment Tool (SFEAT) checklist (Black et al., 2015). The eleven interview participants consisted of one principal, one vice-principal, four teachers, and five nutrition support staff. All but one of the participants were female. Some teachers cover split classrooms—teaching more than one grade in the same room simultaneously. Nutrition support staff included Nutrition Workers (NW) who help prepare meals and snacks, Community School Coordinators, and Educational Assistants who work in the classroom with students and families and act as community liaisons. These participants (labelled as NW to maintain confidentiality) were selected because they understood food program logistics and knew the students and issues. Both teachers and principals are referred to as teachers. Interviews were arranged according to participant convenience. Participants were interviewed individually, except for the principal and vice-principal, who were interviewed together. Interviews were recorded, transcribed, and thematically analyzed. Table 2 shows the questions that guided the interviews.

Table 2: Interview Questions

1. What are the current practices around SFSs and school food programs in schools?
2. What would school staff like to do concerning SFS strategies?
3. What are the barriers, facilitators, and opportunities for adopting curriculum-integrated SFS and food programs in elementary schools?
4. What supports are required to help schools incorporate SFS strategies and food programs into their practices?

We reviewed each subject included in grades two to eight of the online Saskatchewan curriculum (Ministry of Education, n.d.) to determine learning outcomes identified in the curriculum related to environmentally sustainable food systems or food literacy. These data were considered in determining the degree of curriculum integration of SFS concepts. We conducted a policy search, including provincial, school board, and school-level policy, to check for policies supporting SFS or school food programs. This search was included to determine the level of institutional support for SFS integration and policies related to the types of foods available in schools. Relevant learning outcomes and policies were documented and summarized.

School staff assisted with completing the SFEAT (Black et al., 2015), which records current food

gardens, composting systems, food procurement, use of processing and packaging, recycling and waste reduction strategies, food preparation activities, food-related teaching and learning activities, and availability of healthy food. The SFEAT responses were summarized and sent to the principals to verify accuracy. Site observations took place on the days of the interviews to provide more detail on the components assessed in the SFEAT. Interviews and observations were conducted over four days in each school. Potential or existing gardens, composting programs, food preparation, and school layout were assessed to determine how infrastructure was either a barrier or facilitator to developing SFS strategies and food programs in schools. Photographs and notes were taken to capture details. Specifics regarding how teachers incorporated SFS strategies into classroom teaching were obtained from the teachers during interviews. Ethics approval was obtained from the University of Saskatchewan Behaviour Research Ethics committee (BEH 509) and the Saskatoon Public Schools Division.

Data analysis

Participants reviewed the interview transcripts for accuracy and had the opportunity to remove any comments they did not want to be included in the study. Only one participant removed details from the transcript—details tangential to the purpose of the study and not likely to impact findings.

Interviews were transcribed, and NVIVO 12 (QSR International) was used to organize and inductively code interview data. The first author coded transcripts inductively using open coding and constant comparative analysis following grounded theory practices (Glaser & Strauss, 1967). The first round of analysis broke data up into broad categories. Subsequent coding rounds within each category further articulated themes. Coding decisions were accompanied by memo-writing to help develop and compare ideas (Charmaz, 2006; Mills et al., 2006).

The SFEAT documented the baseline context within each school. Member checking is a process where the person interviewed reviews the data gathered to ensure they are accurate (Creswell & Creswell, 2018; Stake, 1995). As the administrator in a leadership role, the principal was best positioned to evaluate the relevancy of findings. Findings were presented and approved by each principal during an in-person meeting.

Results

One school was in a building that opened in the early 1920s, and the other opened in the early 1960s. Both were in low-income neighbourhoods with students from kindergarten to grade eight. The 210 students in one school included a large proportion of Indigenous children. There were 325 students in the other school, including large Indigenous and newcomer populations. The kitchen was located in the basement of one school and on the main floor of the other. The kitchens in both schools were too small for all students to eat lunch, so students ate in their classrooms or in hallways.

SFEAT and observations

The SFEAT was used to determine current practices around incorporating SFS in schools. In one school, the cooking facilities were used by school staff to provide healthy foods in the breakfast, lunch, milk, and snack programs, and for special food days. There was a recent increase in vegetables and healthier meal items, but no change in less healthy items offered. Many of the food items were acquired through donations, and staff did not control nutritional quality. Respondents indicated that providing environmentally sustainable (minimally processed, locally grown, organic, seasonal, or vegetarian) options was complicated because many foods were donated or ordered through another organization. Some local food was procured through grants and donations. Some students helped with meal programs: the student leadership team (grades seven and eight), the health promotion student team (grade six), and a few other students who helped with breakfast to support in transitioning from the home to the school environment. There were some cooking activities implemented with students in the past. The Little Chefs program (run by a local community organization) taught students cooking skills, but this was not running in the previous year. Recycling in classrooms was limited to beverage containers as there were no sinks in classrooms to rinse recyclables. However, kitchen workers recycled beverage containers, cans, certain plastics, and paper products. The grade seven-eight split class, with the help of parents, were involved with gardening activities. The school had eight four by eight meter garden beds, an Indigenous circle garden bed, and was developing an outdoor classroom. They used the gardens to teach about food, gardening, and healthy eating. There was no composting program.

In the second school, data collected from the SFEAT identified available cooking facilities were primarily used by school staff to provide breakfast, lunch, milk, and snack programs. Food preparation was only taught to a few students, mainly those who needed additional support or learning opportunities outside the classroom. The resource teacher worked with four to five students who cooked as a social activity. Classes were sometimes involved with a kitchen project, such as one teacher who made mini pizzas as a celebration and learning opportunity. Grade eight students sometimes helped with kitchen clean-up activities and transporting food into the school. Healthy food was available through breakfast, lunch, snacks, milk programs, special food days, and special community events. Food fundraisers included a monthly hot lunch and other events. Some unhealthy foods were available—both served to children and used for fundraisers, such as bake sales and concession items. Some minimally processed, locally grown, organic options were available; however, this depended on what donors supplied and the seasonal availability of local and organic products. Some local, organic vegetables were available when the Nutrition Worker made a bulk order through another organization, but school staff were not informed when the foods were local or organic. Additionally, in the fall, the school sometimes received donations of garden produce.

A well-established recycling program included beverage containers, paper, and plastic products. Some classes participated in school gardening activities, but school staff and students were not composting due to a lack of knowledge and vandalism of equipment.

Curriculum and Teaching Practice

The provincial curricular objectives in grades two to eight were reviewed to determine any relationship to environmental sustainability or food literacy. More specifically, we looked for inclusion of learning outcomes that referenced food skill development that would support students in navigating or engaging with a complex food system. We looked for the inclusion of learning outcomes related to SFS concepts as indicated by references to the social determinants of health, systems and sustainability, and economic sustainability. We compared learning outcomes identified in the curriculum to practices reported by teachers during their interviews.

There were components of SFSs found in curriculum documents and reported by teachers in each grade. Teachers were guided by the learning outcomes in the curriculum but could individualize their approaches. There was an opportunity to teach about sustainable food systems and food literacy; the teacher's interest determined the degree to which this happened. As one teacher stated, "if the teacher decides that that's the important aspect ...then the teacher will pull it out. So that's gonna really vary depending on what the teacher's perspective is."

The learning outcomes identified by the health curriculum provided many opportunities to address food and lifestyle choices and SFS practices. Learning outcomes included talking about healthy foods and meals and discussing the importance of harmonious relationships, including the environment. SFS could be covered through the science curriculum. This included outcomes related to understanding plant growth, soil, diversity, ecosystems, lifecycles, interdependence, Indigenous knowledge of ecosystems, and the human impact on natural ecosystems. Social studies covered the role of agriculture and sustainable management and evaluated the human impact on the natural environment. The grade seven and eight art curricula explored the importance of place, including the relationship to land and perspectives on social issues, including sustainability. Physical education included a component on nutrition and habits to support physical activity. Home economics curricula covered kitchen basics, kitchen and food safety, baking basics, and snacks (Saskatchewan Learning, 2006).

Teachers reported several strategies to cover curriculum objectives, such as providing cooking experiences, recycling, indoor and outdoor gardening experiences, and discussing historical agricultural practices. In practice, the grade two-three teacher in one school used the Little Green Thumbs program (Agriculture in the Classroom, 2019) to grow, harvest, prepare, and eat food and engaged in vermicomposting in her classroom.

Priorities

Many participants indicated hunger as the top food-related priority for the school to address. As one teacher noted, "priorities, making sure students have food in their bellies so that they can learn." Another identified the relationship between hunger and behaviour. A close second to addressing hunger was ensuring the food was healthy, "and making sure that obviously that, it's as nutritional as I can get it." As long as students are hungry, focusing on nutritional quality and SFS in schools will be challenging.

Other initiatives, such as outdoor and indoor gardening, composting, and reducing waste, were identified as priorities, demonstrating sustainability thinking. A teacher stated, "It would be amazing if classrooms could take their kids outside to learn in the garden." To address time constraints and competing priorities, an NW suggested "doing it outside of the

school dictated times." This participant also suggested recruiting community members to help with gardening activities. Limited staff time impacts the degree to which staff can support SFS strategies.

Participants identified priorities of increasing food choices, including more culturally acceptable and diverse options, providing new foods, and more hot meals. A teacher indicated, "I think that it's something we can address, especially within our school here, is the diversity of cultures. And I think it would be fantastic to be able to highlight different foods, provided they met certain nutritional values."

Participants reported that students' food skills were lacking, yet this is an essential life skill. Increasing food variety was also seen as supporting the priority of increasing nutrition education, especially if students are involved with cooking and developing food skills:

> I think just educating what healthy meals look like, and if students aren't seeing this at home, this helps them to see what this looks like. . . . It's good for students to see how to actually prep these lunches and breakfasts.

A teacher summarized the ultimate goal as "what matters about all this, is really for them to be life-long healthy eaters."

Developing and implementing widespread nutrition policies to be known, supported, and implemented at all levels was seen as a priority. As one participant indicated, "... we need to integrate food and nutrition and health into everything else we're doing." Participants felt that creating a culture of healthy eating, where children feel comfortable asking for food when they are hungry, helps build relationships in the school.

School Food Environment

School food environment refers to actions that the school staff currently undertake without explicit written policy guidance. Current practice was divided into five themes: program availability, food choices served, meal planning with limited resources, sending food home, and what to do when students bring unhealthy foods to school. These themes are not surprising, given the importance of addressing hunger.

The first theme, “program availability”, refers to the accessibility of meal programs. In both schools, some components of meal programs were universally accessible, and other components were "needs-based.” However, there are no eligibility requirements for the "needs-based" program; all students are theoretically able to access them. According to a principal, most of the food program funding was from donors and community partners based on the school population. The school division provided funding for staff time and some program resources, with amount determined by the average number of students using the program. School staff determine how funding is spent; for example, the NWs decide what food to buy. However, the funding of needs-based programs is determined by the number of participants the previous year, so the amount of funding received does not increase if more students participate on a given day. As a result, the lunch program is not heavily advertised to keep participation numbers low.

Teachers sent children identified as not having enough to eat to get something from the meal program. In one school, a teacher stated that, when she notices students lacking lunch or healthy options, she sends them to the lunch program to supplement what they have. The NW accommodated late children who had not had breakfast by giving them food items they could

carry and eat in their classrooms. Staff reported trying to support hungry children. One teacher stated:

> Yeah, a lot of kids come at the end of the day looking for snacks to take home. And it's never, no. We'll take them to the lunchroom, "Here's one for your pocket- and a couple for your little siblings at home."

The theme "food choices served" refers to the nutritional quality of foods served in meal programs and available in the school. The NWs reported doing their best to include healthy foods and making unhealthier donations, such as sausages or cookies, better by serving them alongside healthier choices. An NW reported that, previously, there were written policies guiding food choices in schools, however, with changes in programs, that was lost over time. This explains why staff could not identify written policies to guide practice; however, there was some memory of these policies. An NW identified the importance of including "the basic food groups" and stated that "the policy is understood." Due to insufficient time, the NW in one school served sandwiches because she did not have enough time to serve a hot meal every day. The NW in the other school tried to serve a hot meal every day, "because I know I have students in my building that the only hot meal they sometimes get is in our school. Sometimes the only meal or food that they get is when they walk into our building."

The third theme, "economic planning", refers to the careful managing of finances and making the most of the foods available. One NW stated: "we get 'x' amount of dollars, and I've gotta make this amount of dollar last for ten months, to serve this many kids." She described doing this by discouraging food waste, reusing leftovers, finding creative ways to use donations, purchasing foods on sale when possible, and trying to make the best use of the food they have. The NW described: "we started changing what the meals were looking like and finding ways to stretch dollars different. I'm a huge believer of reduce, reuse, reduce, reuse." An example she gave of reducing waste was to use food before it went bad: "we froze some of the milk [before it went bad] and then the frozen milk can be used in soups."

The theme "sending food home with students" was important as half the participants—an NW and two teachers in one school and two NWs in the other school—recognized the need for this and reported they had sent food home. Even though there was no formal policy, one NW justified this practice by referring to the absence of food when school is not in session:

> So that's why they [students] get apprehensive on a Friday because there's a weekend where they have no food on the weekends. That's why they [students] get apprehensive before a long break from school. So we just came off a break. We had heightened behaviour Wednesday, Thursday, Friday because the kids knew that they were gonna be without for the week, right? So you see it within the students.

Although several participants had sent food home with hungry students, not all were sure it would be acceptable because there was no policy guiding their decision-making. When faced with a mom asking to take some food for her sick child, one teacher was unsure what to say:

> ...a parent came in and said, "Oh, you're having that, do you mind if I just take a little bit home?" I really didn't know what to say, and I was like, "sure go ahead." I probably wasn't supposed to do that, but. I don't know. The kid was sick. My kid- my student, was sick. I think she wanted to take it home. ...I allowed them to.

Clear, explicit policies would support teachers and help staff to be consistent in practice.

The final theme is "bringing unhealthy food to school". Teachers have a lot of power in determining the types of food in their classrooms; however, there are no policies to guide this. There were no identified policies restricting unhealthy foods in school, but practices included taking sodas brought to school away until the end of the day. If children had unhealthy foods in their lunches, they might be encouraged to get healthy foods from the food program. Sometimes, parents dropped off a fast food meal:

> ...and then our whole classroom smells like McDonald's, whereas these kids are trying to eat their healthy [lunch]- and they look over, and see a kid enjoying a big mac, it's really hard [for the other students to eat healthy when another student is eating fast food].

The lack of clear guidelines or policies made it difficult to support schools in encouraging healthy choices.

Written policy

Provincial documents state that Boards of Education are responsible for developing school policy (Saskatchewan Ministry of Education, 2019). Individual schools are encouraged to use supporting documents, such as the Comprehensive School Community Health Approach (Government of Saskatchewan, n.d.) and Healthy Foods for My School (Public Health Nutritionists of Saskatchewan, 2014), to develop policies. The latter document provides specific guidelines for classifying foods according to the best nutritional choices. No specific food policies existed in the two schools in this case study. There were no specific policies identified that related to environmentally sustainable practices.

Barriers, Facilitators, and Opportunities

The barriers, facilitators, opportunities, and priorities for implementing SFS and food programs in schools are shown in Table 3. These were identified through thematic analysis of the interview transcripts. Funding impacted both sustainability initiatives and food program offerings.

Insufficient funding hindered SFS strategies such as gardening, composting, and reusable dishes. Tools and a lack of indoor and outdoor gardening infrastructure and management plans are included. In some cases, staff used disposable dishes due to insufficient staff time; alternative options, such as including students in washing dishes, had not been explored.

Funding was the most significant barrier impacting program access, food variety, food options, and limits in staff time, leading to lunches being sandwiches instead of a hot meal. An NW explained:

> It's about the manpower issue. Like when you are doing salads, are you going to have enough time to run that through? We used to have more [staff]... but when the cutbacks came a couple years ago... now I have less hours.

In one school, the NW indicated that food variety was limited by cost and donations. Participants in the other school stated that the school purposefully provided an opportunity for students to have foods they might not have at home. Schools do not have a class-wide sit-down meal because teachers take their lunch breaks simultaneously with students, so there are few teachers to supervise. In one school, teachers turn on the television to help manage lunchtime behaviour.

Curriculum resources facilitated incorporating SFS education when teachers had access. According to a teacher, funding cuts to education resulted in

disbanding a central resource centre for the school division. Teachers in both schools reported that curriculum resources were essential to support teaching, especially when it was in an area with which they were less familiar.

Personal attributes of staff, such as being creative, hardworking, and passionate about their work, contributed significantly to the reach of meal programs. An NW identified the importance of being creative: "I'm a budget-shopper, [I've come up with] more creative ways to use donations that are coming in." Staff work hard to complete their assigned work. A teacher described an NW by saying, "the woman we have working in there, honestly, is like a tornado. She hustles, and she's got it all set out." Staff report caring about the work they do. Some staff work extra hours to get their jobs done. One NW indicated that she often gets pulled into the nutrition room because no one is there that day, and she struggles to get her work done. She works overtime to catch up and describes her job as "a paycheck of the heart" and says, "it has to be a bit of a passion."

Relationships with funders, outside school supports, and community members were found to be facilitators. Essential resources for food programs came from organizations providing grants, food, and equipment donations. For example, nursing students helped support community events, and community members helped support garden projects. Many activities supported SFS in schools as well as further opportunities to foster consistencies in practice, as described in Table 3.

Table 3: Barriers, Facilitators, Opportunities & Priorities

Barriers	**Facilitators**	**Opportunities**	**Priorities**

Funding
• Program access
• Food variety
• Food options
• Staff time
• Infrastructure
• Gardening space and equipment
• Composting—safety
• Reusable dishes—time
Curriculum resources
• Disbanding of the central resource centre
Noon-hour supervision
Vandalism
	School staff characteristics
	• Creative
	• Resourceful
	• Budget-shoppers
	• Work hard
	• Staff care
	• Work extra hours
	Relationships
	• Funders
	• Health-promoting staff
	• Nursing students
	• CHEP Good Food, Inc.
	• Community members
		Foster consistency in practice
		• Support healthy food choices—policy
		  ○ Donations
		  ○ Fundraisers
		  ○ Sending food home with students
		  ○ Response to soda pop in school
		  ○ Quality of food brought from home
		  ○ Staff modelling
		• Knowledge/practices when staff leave
			Address hunger
			Nutritional quality
			Gardening
			• Indoor
			• Outdoor
			• Composting
			• Reducing waste
			Increase food access and variety
			Increase food skills
			Policy

Discussion

This research aimed to understand the capacity of local elementary schools to implement SFS strategies in curriculum policy and practice. Both schools were located in low-income neighbourhoods and included large Indigenous or newcomer populations. Findings showed that, although both schools could incorporate some SFS strategies, both schools felt that addressing hunger was the top priority. The food programs in place were considered available to all but not overly advertised, because there were insufficient resources to feed students. School staff spent considerable energy procuring sufficient food and stretching what was available to feed as many students as possible. As a result, there was limited focus on SFS strategies. Staff characteristics, such as being hardworking, skilled, resourceful, creative, and passionate, facilitated supporting SFS strategies. Relationships with donors, funders, nursing students, and community members facilitated program delivery. It is essential to have consistency from year to year in program availability and curriculum components dealing with SFS because staff changes are a regular part of the school environment.

Critical components to consider include curriculum, policy, and practice (Chapman et al., n.d.), as well as facilities and staffing levels, having program continuity plans, and building relationships. For example, the curricula for grades two to eight have several supportive required educational outcomes. However, how teachers address each topic depends on teacher interest and knowledge level. Teachers who were passionate and knowledgeable about an area, such as gardening, felt comfortable including it in the curriculum and used several innovative and experiential strategies. For example, the Little Green Thumbs program (Agriculture in the Classroom, 2019) was used by one teacher to provide students with experiential learning. Incorporating other programs, such as Farm to School, could also be explored to increase food literacy and connection to local food (Farm to Cafeteria Canada, 2021). Curriculum support resources are no longer as readily available due to provincial funding cuts, making it more challenging for teachers to access resources efficiently.

Some curriculum components and practices support food literacy and food system sustainability. Although there is a reference to interdependence in the curriculum, it is up to teachers to explain how food choices relate to environmental sustainability. Most curricula were developed between 2009 and 2011, before the 2015 Truth and Reconciliation Report was published (Truth and Reconciliation Commission of Canada, 2015). How sustainability is addressed should consider appropriateness for schools with a large Indigenous population. Indigenous land-based education that sees land stewardship as a way of life may be more appropriate in these cases (Bentham et al., 2019). Supportive curriculum updates would ensure that food literacy and food sustainability practices are a direct focus.

Although policies are essential for schools to support SFS, policy documentation and support are lacking. Policies could address the quality of food brought from home, nutrition guidelines for food served, class incentives, fundraisers, sustainability, and a plan to communicate these policies. Although staff are motivated to address environmental and nutrition issues, they cannot consistently optimize their efforts due to competing priorities and a lack of prioritization, policy, and financial support. Food programs at Community Schools are driven by the need to address student hunger, and, when resources are tight, food

quantity is valued over food quality. Access to adequate, healthy, nutritious food supports optimal academic achievement and health (Bundy et al., 2013; Ritchie et al., 2015). The suboptimal quality of foods offered can lead to unintended negative consequences and foster unhealthy eating patterns that could have long-term health impacts. Adequate support and training are needed to ensure policy adherence (McIsaac et al., 2015). Schools should provide a healthy food environment for students through policy, support, and prioritizing a healthy food culture within schools.

School policy relating to environmental sustainability may be broad. Beveridge et al. (2019) have identified five domains related to policy and sustainability in the school context: governance, curriculum, facilities and operations, research, and community outreach. Governance refers to the overall vision of the institution, including sustainability, and illustrates how priorities are supported through leadership and management. Curriculum policy emphasizes how sustainability is incorporated into the curriculum. Sustainability in operations refers to how conservation efforts of physical infrastructure manifest, such as through water or energy conservation. Research in school sustainability suggests the types of community or industry research partnerships. Community outreach indicates sustainability collaborations with people or organizations outside the school. Of the many ways of incorporating sustainability into education, the provincial ministry of education in Saskatchewan only incorporates sustainability into the curriculum through cross-curricular competency frameworks (Beveridge et al., 2019). It may be challenging to reach cross-curricular outcomes without additional policies to support sustainability initiatives. Dedicated staff could play a significant role in supporting sustainability initiatives; however, only seven percent of Canada's school divisions have a staff member dedicated to this role (Beveridge et al., 2019).

Practices in schools can support curricular components around sustainability and healthy eating. Including students in composting and recycling programs gives them practical experience and models initiatives they could participate in outside of the school context. Food programs can provide healthy foods, and teachers can model eating practices by providing new foods for students that may not be accessible at home. Enjoying hot meals in a social environment without other distractions would benefit students and help develop social skills, and is consistent with mindful eating as promoted by Canada's Food Guide (Health Canada, 2019). These eating experiences may not be available to some students in their home environments. To include hot, sit-down meals that students help prepare, schools require adequate funding for appropriate supervision. Family-style hot meals in school support healthy growth and development, social skills, and healthy eating practices (Oostindjer et al., 2017).

Adequate and essential facilities and staffing levels are required to operate composting, recycling, gardening, and school food programs. Vital infrastructure includes composting facilities, sinks to rinse recyclables, gardens, an operational kitchen with storage space, equipment to transport food safely, and the ability to keep food safe. Infrastructure can be a challenge in schools. Creative solutions may need to be found, such as sharing or using community spaces like community churches or gardens (Rojas et al., 2016). Infrastructure challenges vary by school. When challenges exist, adequate resources are required to mitigate them. Adequate staffing levels are necessary to ensure relief coverage, personal and program development time, and program evaluation. Incorporating gardens and composting systems into

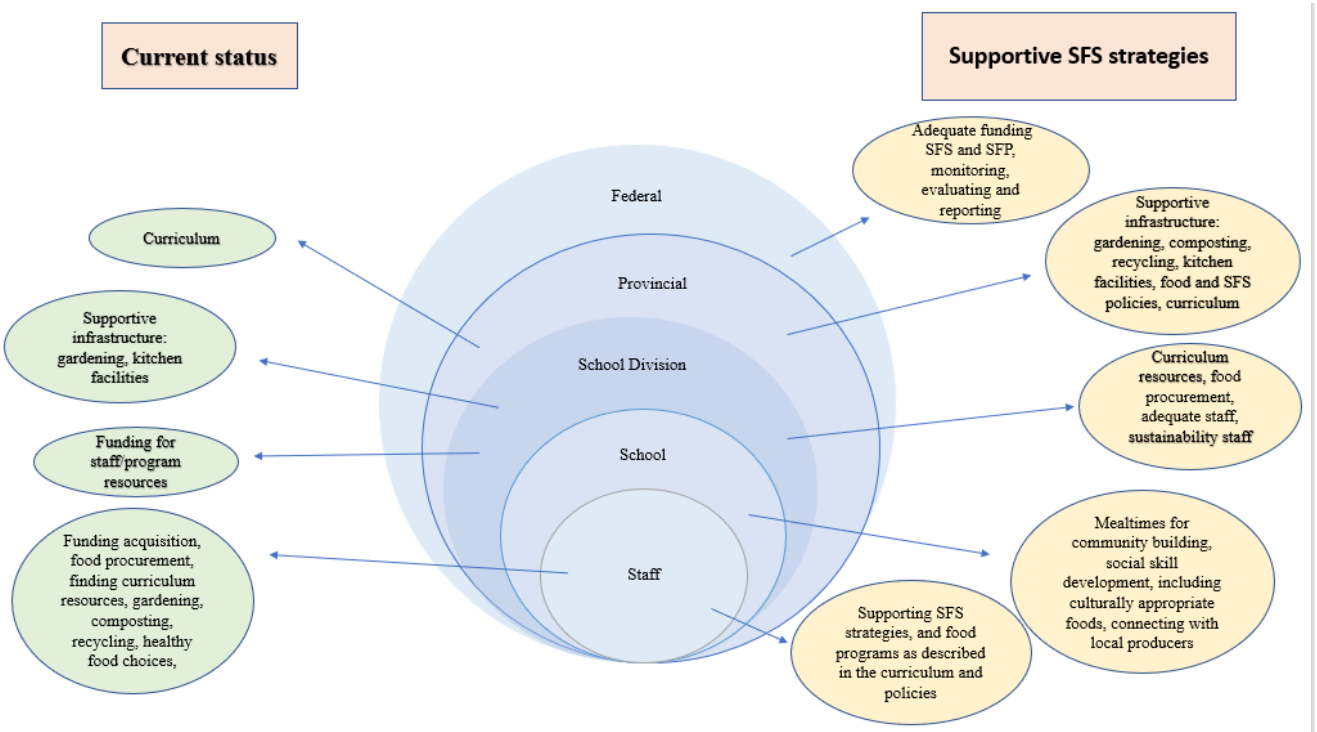
maintenance plans would help support their success. Providing enough staff time to clean dishes or organize students or volunteers would also reduce waste created from disposable dishes.

It is crucial to have continuity in program availability and curriculum components that deal with SFS because changes in staff are a regular part of the school environment. These schools identified many SFS practices. Some initiatives were undertaken previously but had been discontinued. For example, composting was discontinued due to a lack of knowledge and vandalism of equipment. Prioritizing initiatives and providing the necessary support for program continuation would help ensure program sustainability and ensure that efforts to start programs are not lost. The concern about initiatives being lost over time due to a lack of supportive policies has been noted elsewhere (Rojas et al., 2016).

Building relationships in the community and forming partnerships are essential components of SFS strategies (Rojas et al., 2016). Community building may occur at many levels—within the school, or with local community members and parents, volunteers and charities, and local businesses. Respondents indicated that schools would benefit from the support of community members and volunteers, but can also act to bring people together through school-run family meals, events, and gardening.

Schools operate in complex contexts, impacting the capacity to integrate SFS strategies. Viewing support for integrating SFS practices through the Socio-ecological Framework can help identify if supportive factors act across multiple levels (Onwuegbuzie et al., 2013) and assist in determining appropriate actions to move towards SFS in schools. Figure 1 illustrates where the responsibility of incorporating SFS and school food programs currently lies in the schools included in this case study, along with a recommendation for how responsibilities could be shifted to be more supportive of SFS and food programs in schools. This case study analysis demonstrates that the bulk of the responsibility for integrating SFS strategies lies with NWs and teachers. A more supportive environment would shift responsibilities, so that all levels are supportive: from school, school division, and province, through to the minister of education and the federal government. This way, school staff could operate in an environment that is supportive at all levels.

Figure 1: Framework for Sustainable Food Systems in Schools



Schools play an integral role in supporting SFS and food programs. The Comprehensive Community School Health Framework and the philosophy of Community Schools put the schools in this case study in a solid position to become leaders in school food. Staff are motivated, work hard, and care about students' short- and long-term goals. Prioritizing SFS strategies and school food programs, which are foundational to school culture, will provide optimal nutrition and learning experiences with food and sustainability practices that students may not otherwise have.

Policies, developed at the school division level, tailored for the school context, with the input of students and community members, and implemented at the school level, would strike the balance of being appropriate for the school while providing the structure to support consistent practice. Developing partnerships with local producers, both for local food procurement and student engagement through farm visits or work projects, would provide learning opportunities for students to understand where their food comes from.

The diet quality of school-aged children and food system sustainability concerns are national in scope. A national strategy would address these issues across the country. A universal, health-promoting, multi-component, sustainable food program in Canada that respects cultural diversity would address this national concern (Hernandez et al., 2018) and would have the potential to help Canada integrate health and environmental sustainability in the school food context (Oostindjer et al., 2017). Canada will need to be intentional to move towards food system sustainability, because, although there is interest, sufficient supports are not in place. Adequate funding for program delivery and sufficient monitoring, evaluation, and reporting resources are needed to ensure schools meet sustainability goals (Beveridge et al., 2019).

Limitations

Findings from this study may not apply to schools in other contexts. The infrastructure and support for SFS and school food programs may not reflect what is available in all schools. Conclusions developed from the data collected in this study may be missing components or may not be relevant to other contexts. However, school principals approved the research findings. Therefore, we are confident in the case assessment and in the likelihood of similarities across similar schools.

Conclusion

School food programs can address diet quality, food insecurity, and environmental sustainability. Components to consider in environmentally-sustainable school food programs include curriculum, policy, practice, facilities and staffing, relationships within the community, and planning to sustain programming through challenges and changes. Limited resources for school food initiatives make it challenging for staff to consider the consequences of food programs on the environment; subsequently, it becomes more difficult to have food programs for students that consider environmental health. The bulk of the responsibility for integrating SFS strategies lies with school food staff, teachers, and women in this case study. Shifting this responsibility to include all levels, including the school division and provincial and federal governments, would create a more supportive environment. Improved support systems would allow schools to prioritize sustainable food systems and school food programs, which are foundational to school culture and to supporting lifelong sustainability and healthy eating practices.

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