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Abstract

This article describes a novel approach for introducing 4-H to non-traditional/diverse audiences using 4-H Food Challenge. Set in a low SES and minority-serving rural school, Food Challenge was presented during the school day to all 7th grade students, with almost half voluntarily participating in an after-school club component. Program design supported school-level STEM enrichment and career development priorities. Topics addressed ranged from food handling/safety to nutrition and cost analysis. Conclusions include a summary of student outcomes and recommendations for school and adult partnerships. Implications for reaching non-traditional 4-H audiences through non-competition formats are discussed.

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Introduction

4-H has and continues to face challenges in sustaining participation and reaching new audiences (Harder, Lamm, Lamm, & Rose, 2005; Hobbs, 1999; McKee, Talbert, & Barkman, 2002; Van Horn, Flanagan, & Thomson, 1999). Challenges include:

- Retaining club members beyond elementary school;
- Increasing diversity of race/ethnicity;
- Changing community, family and socioeconomic environments (e.g., shrinking pool of volunteers, increased extracurricular activities).

4-H participation is shifting from traditional (community-based clubs) to special-interest projects and school-based programs focused on STEM enrichment (National 4-H Enrollment Report, 2012). Although Texas has the largest state 4-H program, less than 10% of its youth members participate

through clubs, while 41% participate through special interest projects and 43% through school enrichment programs (Texas 4-H Youth Development, 2014).

Schools have long partnered with Extension and 4-H. Burrows and Zaremba (1982) provided an overview of the needs/advantages for 4-H expanding into schools. Factors they identified over 30 years ago are still issues today (e.g., recruiting adult volunteers, locating meeting space, accessing diverse youth/parent audiences). In the current setting of high-stakes testing, 4-H needs to continually innovate inclusive programs that actively support school-level performance goals for a diverse student body.

We present a collaborative effort to forge a working partnership between a rural school, 4-H, and Extension that would serve to provide academic support and engage a non-traditional audience with little prior knowledge of 4-H programs, clubs or projects. Characterized by low SES and a Hispanic student majority, our partner school is accredited as an Early Collegiate/STEM academy to encourage higher education obtainment and address shrinking enrollment. Drawing upon the school's STEM focus, the 4-H Food Challenge project was selected because it combines core competencies in science and math with hands-on culinary skills to enrich the recently implemented 4-H school program.

Food Challenge

Food Challenge was developed by Texas A&M AgriLife Extension and introduced to 4-H as a new Food and Nutrition Project option in 2009 (Dodd & Womble, 2010). Based on cooking competitions popularized by reality television programs, Food Challenge is a team (rather than individual) Food and Nutrition project. In 2012-2013 almost 120,000 students enrolled in Food and Nutrition projects (of which Food Challenge teams comprised a substantial part), representing the second highest participation rate in Texas 4-H (Texas A&M AgriLife Extension, 2013). There are six components of Food Challenge: (a) cooking equipment/uses, (b) kitchen safety, (c) food safety, (d) nutrient analysis, (e) cost analysis, and (f) task management.

The Food Challenge project designed for this school focused primarily on:

- Providing an appealing introduction to 4-H for a less traditional and more diverse audience and
- Improving nutrition knowledge, food competency and dietary behaviors among middle school youth.

Secondary aims included:

- Supporting STEM learning objectives;
- Fostering connections between education and career opportunities; and
- Strengthening relationships between families, school, and Extension.

Project Design and Implementation

Food Challenge has been offered to Texas 4-H members since 2010, yet the resources provided at the state level have not included a formal curriculum. Club leaders and county agents are free to prepare

their teams for Food Challenge contests based on general competition guidelines. We used a multidisciplinary team (Braverman, Franz, & Rennekamp, 2012) that collaborated to develop a curriculum and implement the program. Team members includedL

- Two 4-H/Youth Development Specialists (one appointed full-time to support STEM at the partner school),
- The local county Family and Consumer Sciences agent,
- Two faculty/post-doctoral fellows in Nutrition Sciences, and
- One doctoral student in Education.

The program was delivered in two programming components during the fall semester. The first consisted of an ungraded STEM enrichment class scheduled for 45 minutes on Friday mornings. Six enrichment periods were allocated to the Food Challenge curriculum and were used to deliver content related to food safety and nutrition knowledge (see Table 1). At the request of the STEM 4-H specialists and school administration, all 51 students enrolled in the seventh grade participated in the first programming component.

The second training component of program delivery took place at a voluntary after-school 4-H Food Challenge Club that met once a week for 90 minutes. The club was recognized as a school-sanctioned extracurricular activity, and meetings occurred weekly in the school cafeteria. An open recruitment presentation for the club took place during the first Friday morning enrichment class. Of the 51 students, 25 registered to participate in the club. Nineteen participated regularly; six additional students participated at least once. Club activities built on content delivered during the Friday morning enrichment period but were enhanced by hands-on cooking practice and other experiential learning activities. Table 1 summarizes the lessons addressed and identifies links to STEM learning and connections to higher education/career opportunities. The program concluded with student participation in the county Food Challenge competition (Dodd & Womble, 2010) and a breakfast prepared exclusively by club participants for their families.

Table 1.

Lessons, Club Activities and STEM Connections

Weekly enrichment class (6 weeks; 45 min. lessons)	After-school club activities (9 weeks; 90 min. meetings)	STEM/academic enrichment	Higher education/career connections
Food safety • Food-borne illnesses • Hand washing • Surface/utensil cleaning • Cooking/chilling temperatures	• Ice-breakers (integrating new students) • Team building (breaking down social barriers)	• Food-borne pathogens • Cross-contamination • Heat, liquid &	• Food service • Catering • Food scientist • Lab technician

Kitchen safety • Handling utensils • Burn & fire prevention • Physical safety		energy • Bacterial functions	• Hospitality • Professional chef
MyPlate • Portion sizes • Recommended daily allowances (RDA) for fruits, veggies, grains, dairy, proteins & fat	• Kitchen/ knife/ cooking safety • Cut fruits & veggies • Prepare a healthy snack • Prepare a MyPlate meal • Food Jeopardy	• Understanding RDA measurements (grams, calories) • Nutrient functions in the body • Energy equation	• Dietician • Nutrition counselor educator • Health practitioner • Diabetes or cancer research • Food engineering
Proteins, carbs & fat (PCF) • Definitions and sources • Types and functions • RDA	• Cooking meat & vegetables • Using thermometers	• Understanding food safety • Cooking temperatures	• Food scientist • Culinary professional • Food writer • Technical writer
Vitamins & minerals • Definitions and sources • Types • Functions • RDA	• Calculating cost per serving • Calculating cost per meal	• Arithmetic functions • Ratio formulas	• Financial & managerial accounting • Food economist • Ag. economist
Healthy food substitutions	• Time management	• Efficiency (time &	• Industrial

	• Task management • Oral presentation skills	motion) • Technology & equipment • Scientific communication	engineering • Information technology • Health communications • Food marketing
Nutritional literacy • Reading recipes • Reading & understanding food labels	• County Food Challenge • Parent Breakfast	• Presentation skills	• Public speaking • Food educator • Food service

Program Outcomes

The overall impact of the program was evidenced most by students participating in the after-school club. Outcomes were measured through informal assessments of student knowledge (e.g., nutrient/cost analysis) and skills (e.g., food safety, task management) related to the six Food Challenge components (Table 2). Pre- and post-program assessments in addition to student and parent focus groups were conducted. Data included 4-H participation and knowledge prior to experience in Food Challenge, skills/knowledge gained through involvement, and program success.

Table 2.

Selected Assessment Procedures

Variable of Interest	Method / Instrument
• Positive and negative perceptions of participating in 4-H Food Challenge (after-school club) • Parents' perceptions of how their children benefited from participation	*Focus group interviews* with club participants *Focus group interviews* with parents of participants
Self-reported improvement in: • Consumption, intentions, and self-efficacy for eating fresh fruits & vegetables (FFV), fiber, dietary fat	Selected items from measures of *Social Support and Self-Efficacy for Diet & Exercise Behaviors* (Sallis, Grossman, Pinski, Patterson, & Nader, 1987 and 1988)

• Healthy eating strategies, accessibility, habits, & enjoyment	
Self-reported changes in ability to: • Solve problems • Communicate effectively • Set goals • Accept and value input from others • Work flexibly	*Changes in Leadership Skills* (Seevers, Dormody, & Clason, 1995)

Lessons Learned and Discussion

Building partnerships was essential for program success and for meeting the 4-H needs identified by Burrows and Zaremba (1982). School administration was an indispensable partner, providing space for activities/storage of equipment, access to students during/after school, and access to parents. Volunteers were comprised primarily of university faculty and graduate students. These individuals provided subject matter expertise, mentorship, and supervision. Future iterations of the project will encourage local teachers in Family & Consumer Sciences, Math, and Science to serve as subject matter experts. Teacher involvement strengthens/streamlines the integration of Food Challenge skills with school curriculum. Continued parent support and buy-in can help develop student experiences and forge stronger bonds between home and school.

The school where this program took place actively supports incorporating 4-H into school activities. Due to scheduling conflicts with other after-school events, Friday afternoons were designated for the Food Challenge club, which may have affected attendance. For example, some students reported limited participation due to the needs of non-custodial family members; others reported parents could not change work shifts so after-school transportation was unavailable.

Focus group data from club members revealed that the primary and original motivations for participation in the after-school club stemmed from enjoyment of hands-on cooking opportunities and relationships established among club members rather than the potential to compete in 4-H events. Students expressed interest in sharing their new competencies with peers, teachers, family members, and the wider community through service activities. While the majority of students interviewed noted enjoying weekly intra-club competition, they were not motivated to join/remain in Food Club for competition. Parents noted that in environments of high academic pressure/competition they liked an extra-curricular activity that was not competition centered. These sentiments suggest the importance

of considering varying motivations for participation that extend beyond the contest format of traditional 4-H activities. Adapting popular 4-H/Extension programs to alternative formats may attract a new demographic of participants and develop more diversity among members.

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