

Nutrition Nuggets for the Family and Consumer Sciences Classroom: An Experiential Approach to Professional Development

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Less than five percent of professional development (PD) opportunities for educators in Iowa are related to health and physical education (Iowa Area Education Agencies, 2017). Even fewer opportunities are specific to health and nutrition-related disciplines such as family and consumer sciences (FCS). Iowa educators are required to earn six license renewal credits every five years to renew their teaching license (Iowa Board of Educational Examiners, 2018). This article describes and evaluates a project designed to provide nutrition PD for FCS educators that included technical content for high school nutrition and health educators to improve nutrition self-efficacy, cooking skills and attitudes, and eating competence.

Background

Experiential Learning Theory

Career and Technical Education (CTE) programs consist of sequenced courses preparing students for employment. The FCS curriculum encompasses parenting, conflict management, cooking and sewing, personal and family finance, and other topics directly related to daily living. This curriculum typically addresses multiple subject areas. For instance, culinary classes in FCS classrooms extend beyond basic food preparation, emphasizing personal health and nutrition, science, and economics (American Association of Family and Consumer Sciences, 2017).

Concepts in CTE programs tend to be delivered in a very tactile manner. Experiential learning theory (ELT), which includes tactile experiences, is arguably the most successful approach to learning, particularly for nutrition and health behavior change (Coker, Heiser, Taylor, & Book, 2017; Diker et al., 2013; Dudley, Cotton, & Peralta, 2015; Parmer, Salisbury-Glennon, Shannon, & Struempler, 2009; Scogin, Kruger, Jekkals, & Steinfeldt, 2017). Developed as a bridge between cognitive and behavior change theories, ELT is a continuous cycle of four learning phases: concrete experience, reflective observation, abstract conceptualization, and active experimentation (Kolb, 1984). One reason ELT is so successful is the development of non-cognitive skills including problem solving, team-building, oral communication, professionalism and work ethic (Scogin et al., 2017). These skills are not necessarily taught with this approach but cultivated during the process of learning. As ELT is widely used for educational programming in many populations, it is logical for PD and continuing education to be created using ELT for maximum interest, engagement and retention for educators, which then extends to their students (Diker et al., 2013).

Self-Efficacy and Eating Competence

While ELT has consistently been shown as an effective method for increasing knowledge and retention of subject matter, researchers agree knowledge does not translate directly to behavior change: the impact of interventions on skills and behaviors also needs to be considered. Self-efficacy can be described as one's belief and ability to succeed in specific situations or accomplish a task (Bandura, 1977). Self-efficacy is a powerful indicator of the impact of educational interventions, such as tactile learning experiences, because as people practice and build skills, become empowered and confident in these skills, and are supported to succeed, they are more likely to achieve and sustain behavior change (Austin & Sonnevile, 2013; Buchanan, 2004; Lytle, 2005). For educators, self-efficacy and affinity for educational material correlates with willingness to implement that material in their classroom, as well as effectiveness of delivery (Richards, Pratt, Skolits, & Burney, 2012)

While examining self-efficacy for eating behaviors is subjective, an objective measure to examine eating behavior is eating competence (Cunningham-Sabo et al., 2016; Krall & Lohse, 2010; Lohse et al., 2007; Satter, 2007, 2008). Eating competence is defined as the collective balance of positive eating behaviors and attitudes (Satter, 2007). The Satter eating competence model, used in this study, empirically assesses eating competence based on four constructs: 1) eating attitudes and attitudes about food, 2) food acceptance skills, 3) internal regulation skills, and 4) contextual skills (Satter, 2007).

The first construct in Satter's (2007) model, eating attitudes, encompasses the ability to comfortably enjoy desired foods in desired amounts. The development of this construct was based on clinical observations of the following attitudes: body dissatisfaction, interpersonal distrust, social insecurity, and an individual's drive for thinness.

Satter's (2007) second construct, food acceptance, includes the ability to try new foods and incorporate a variety of foods based on learned preferences, genuine interest, and enjoyment of food. This construct was based on observations of the number of foods liked, disliked and/or never tried, and the current stage of change for incorporating fruits/vegetables into an individual's regular daily diet.

Internal regulation, Satter's (2007) third construct, comprises the ability to trust and respect the body's instinctual cues for hunger, appetite and satiety, to modulate when to start and stop eating. This category includes eating disorders, financial stress and food security, and restrictive food behaviors.

Satter's (2007) final construct, contextual skills, covers concepts related to an individual's ability to manage the planning, preparing, and providing of regular, satisfying meals. This category is based on observations related to planning for eating, incorporating all food groups, correctly utilizing food labels/packages, spending time preparing meals from scratch, the frequency of dining in or out, and the enjoyment of cooking.

Individual knowledge, self-efficacy, attitudes, and behaviors of FCS educators can influence their classrooms and, ultimately, their students. Assessing educator self-efficacy, eating behaviors, attitudes, and eating competence can help identify their ability and effectiveness in delivering similar subject matter, as well as identify areas of improvement (Diker et al., 2013).

The objectives of this research were to: 1) Develop a health and nutrition-related curriculum using ELT for FCS classrooms; 2) Use this curriculum to create a PD opportunity for FCS educators; and 3) Improve FCS educators' nutrition self-efficacy, cooking skills/attitudes, and eating competence to impact their ability and willingness to teach health and nutrition-related topics.

Methods

Curriculum Development

Prior to the current study, a survey of 90 Iowa FCS educators (unpublished data) was conducted to assess PD needs and preferences. Information gathered included current sources and methods for gathering information (internet, journals, text books, blogs, e-learning); education field (coach, FCS educator, health or physical education, nurse, other responsible for nutrition education); class schedule type (traditional, block); opinions on importance of various nutrition topics and likeliness of implementing them (calcium-rich foods, food safety, food preparation skills and methods, genetically-modified organisms, MyPlate, organic versus conventional foods, protein supplements, sports nutrition, whole grains, unit pricing), importance of teacher license renewal credits for PD opportunities; preferred methods of learning and teaching (face-to-face workshops, live webinar, recorded webinar, combination). Survey results and the Dietary Guidelines for Americans 2015-2020 guided development of the curriculum and related PD opportunity offered to Iowa FCS educators.

The PD needs and preference assessment (unpublished data) of Iowa FCS educators identified eight topic areas: 1) diet analysis tools and label reading; 2) food safety in the kitchen and industry; 3) protein sources, supplements, and quality; 4) types of fat and related health effects; 5) sugar-sweetened and caffeinated beverages; 6) influences of marketing on eating behaviors and competence; 7) snack habits and quality; and 8) career opportunities in food science and nutrition.

Lessons for this research were developed using ELT and included lecture and hands-on activities, such as practical laboratory experiences, teamwork and discussion, student presentations, and class discussions. Two 45-minute lessons were designed for each topic area. The two lessons could be combined to accommodate 90-minute block schedules. Materials for each lesson included a lesson plan, PowerPoint® presentation, materials list, grocery list, recipe cards, worksheets, supplemental resources, food labels and other resources. The curriculum and PD opportunity were named *Nutrition Nuggets for the FCS Classroom* (hereinafter *Nutrition Nuggets*). This study was approved by the Iowa State University Institutional Review Board.

Participants

Nutrition Nuggets PD opportunity was advertised through the IAEA PD Online catalog, FCS educators' statewide listserv and promoted by Human Sciences Extension and Outreach (HSEO) Nutrition and Wellness Program Specialists. Participants had the opportunity to engage in two PD opportunities, each awarding one credit of teacher license renewal. A convenience sample of 24 educators participated in the hybrid training. Of the educators who participated in the training, 100% were FCS educators, two were also coaches.

***Nutrition Nuggets* Training:**

The first PD activity used a hybrid format. Successful completion required finishing the online portion (eight hours) and a face-to-face regional workshop (eight hours). The online portion included viewing pre-recorded lessons (eight voice-over PowerPoints®) and completing readings, assignments, and discussion posts about topics in nutrition and health (i.e., supplements, genetically-modified foods, fad diets, etc.).

Participants also attended a workshop hosted regionally by a HSEO Nutrition and Wellness Program Specialist. Regional workshops were either one eight-hour session or two four-hour sessions depending on the HSEO Nutrition and Wellness specialist hosting the

workshop. During the workshop, participants completed all experiential activities for each lesson. These activities included preparing recipes, conducting sensory analyses, completing worksheets, accessing online nutrient analysis databases, utilizing dietary analysis software, and identifying credible information sources. Upon successful completion of all online and workshop activities, participants were awarded one teacher license renewal credit.

Participants successfully completing the hybrid training could complete the second PD activity by using the curriculum in their classroom. To satisfy the requirements of the second activity, educators taught and evaluated eight lessons. Teachers also completed an implementation log (date, time, number of students, comments) and pre- and post-implementation surveys. Lesson implementation provided the 15 hours contact time required for teacher license renewal credit (Iowa Board of Educational Examiners, 2018). Once the appropriate documentation was submitted, participants received one teacher license renewal credit.

Surveys

The impact of the PD opportunities on participants' nutrition self-efficacy, cooking attitudes and skills, and eating competence was examined using previously-validated tools discussed below. Surveys consisting of 61 items were administered prior to hybrid training (T1), after hybrid training (T2) and after implementation of curriculum (T3). Surveys were administered electronically via Qualtrics (Qualtrics 2018, Provo, UT), and could be completed via smartphones, computers, tablets or any device with internet capabilities. Surveys included six demographic questions. Participants were assigned the Economic Research Service (ERS) Rural Urban Continuum Code based on location of their school (Parker, 2016) as geographic location is associated with health literacy, health status and other health-related modifiable risk factors (National Center for Health Statistics, 2017).

Nutrition self-efficacy was measured with five items using a four-point Likert scale adapted from Schwarzer and Renner (2000). Cooking skills (14 items) and attitudes (four items) were examined using a survey developed by Condrasky and colleagues (2011). Both scales (cooking skills and attitudes) use five-point Likert scales. Internal consistency of cooking skills (Cronbach $\alpha=.91$) and attitudes (Cronbach $\alpha=.95$) as well as test-retest reliability ($r=0.63-0.88$) coefficients were reported. The sample used to validate this tool was diverse in age, race and employment status.

The Satter Eating Competence Inventory (2007) (ecSI 2.0) includes questions related to the four constructs as previously described: 1) eating attitudes (five items); 2) food acceptance (three items); 3) internal regulation (three items); and 4) contextual Skills (five items). The ecSI 2.0 uses a five-point Likert scale with a total possible score of 48. A higher score indicates greater eating competence, while a lower score indicates lower eating competence. The ecSI 2.0 has reported internal consistency (Cronbach $\alpha=0.77$) and reliability ($r=0.68$; $p<0.001$) (Stotts & Lohse, 2007). It has been validated as a tool for measuring eating competence in demographically diverse populations (Cunningham-Sabo et al., 2016; Psota, Lohse, & West, 2007) including both low-income (Krall & Lohse, 2010; Lohse et al., 2007) and non-low-income females ages 18-49 (Stotts & Lohse, 2007).

Data Collection and Analysis

Prior to the hybrid training, participants were asked to complete a pre-survey (T1). After completing the workshop, participants were asked to complete a post-training survey (T2). If

participants elected to implement the curriculum, they were asked to complete the post-training survey a second time (T3) after implementing all lessons in their classroom.

Scores were calculated for each tool included in the survey. Scales were scored such that a higher score reflected more positive attitudes, skills or self-efficacy. In total, there were eight scores (maximum score): 1) nutrition self-efficacy (20); 2) cooking skills (70); 3) cooking attitudes (20); 4) overall eating competence – “ecSI” (48); 5) eating attitudes (15); 6) food acceptance (9); 7) internal regulation (9); and 8) contextual skills (15).

Scores were calculated at each time point (T1, T2, and T3) for each of the tools included in the survey. Change scores were calculated for each score (T1 to T2 for both groups; T1 to T3 and T2 to T3 for the implementation group) to examine the impact of the two PD opportunities.

Statistical analyses were conducted using SPSS 24.0 (IBM SPSS Statistics for Windows, Version 24.0). Paired t-tests were run on each score between each time point (T1 and T2 for both groups; T1 and T3 for the implementation group; T2 and T3 for the implementation group) using the Bonferroni method to correct for type 1 error (Table 2). Independent samples t-tests were conducted on the change score by training and implementation groups as well as dichotomous variables such as years teaching (greater than or less than 20 years), rural or urban location, and number of teaching roles (multiple vs FCS only). Finally, Spearman correlational analyses and Analyses of Variance (ANOVAs) were conducted to explore demographic variables and survey scores. Significance was set at $p \leq 0.05$ for all statistical analyses.

Results

Twenty-four educators completed the *Nutrition Nuggets* hybrid training. Of these, 10 (42%) successfully implemented all eight lessons in their classroom. Many participants chose not to implement the lessons for three main reasons: 1) teaching plans for the upcoming semesters were already determined; 2) requirement to complete all components as instructed; and 3) difficulty of lessons for their student body. Of the 24 participants who completed the PD, all were FCS educators, and five (22%) reported multiple teaching roles including coach, health or physical education. Six (25%) taught in urban areas, while 16 (67%) taught in rural areas, 2 (8%) did not indicate school location. Participants in urban areas were more likely to have multiple teaching roles compared to participants in rural areas ($t=2.75$; $p=0.03$). Nearly 60% reported teaching for greater than 20 years.

Paired t-tests of survey scores (T1→T2) indicate participants of training-only exhibited a significant decrease in contextual skills ($p \leq 0.05$) (Table 1). No other significant changes were observed for either group (training-only or implementation) between pre- and post-training.

Paired t-tests of survey scores (T1→T3 and T2→T3) for the implementation group revealed a significant improvement in cooking attitudes, ecSI, eating attitudes, food acceptance, internal regulation and contextual skills. These improvements occurred primarily between T2 and T3 except for cooking attitudes, which improved between T1→T3. Additionally, self-efficacy and cooking skills exhibited a trend ($p \leq 0.10$) towards improvement between T1→T3 (Table 1).

Table 1: Paired T-Tests of Survey Scores by Group and Time Point

| Training Group Only (n=14) | | | |
|------------------------------------|--------------|--------------------------|-----------------------------|
| Variable | T1 | T2 | T3 |
| Nutrition self-efficacy | 65.71 + 3.39 | 66.43 + 3.72 | |
| Cooking skills | 88.37 + 3.67 | 88.57 + 3.88 | |
| Cooking attitudes | 38.57 + 4.55 | 37.50 + 3.91 | |
| ecSI | 31.57 + 2.17 | 29.50 + 1.81 | |
| Eating attitudes | 11.00 + 0.71 | 10.14 + 0.65 | |
| Food acceptance | 4.71 + 0.53 | 5.00 + 0.51 | |
| Internal regulation | 5.71 + 0.47 | 5.79 + 0.30 | |
| Contextual skills | 10.14 + 0.93 | 8.57 + 0.88 ^b | |
| Implementation Group (n=10) | | | |
| Variable | T1 | T2 | T3 |
| Nutrition self-efficacy | 68.89 + 6.55 | 71.25 + 3.98 | 77.50 + 2.83 ^c |
| Cooking skills | 88.57 + 3.38 | 85.71 + 3.68 | 91.07 + 2.91 ^c |
| Cooking attitudes | 32.78 + 3.83 | 40.63 + 6.58 | 48.89 + 4.62 ^b |
| ecSI | 28.00 + 3.17 | 25.43 + 2.90 | 34.86 + 2.54 ^{a,d} |
| Eating attitudes | 9.44 + 1.04 | 9.25 + 0.92 | 11.88 + 0.85 ^{a,d} |
| Food acceptance | 4.67 + 1.01 | 4.25 + 0.82 | 6.00 + 0.78 ^a |
| Internal regulation | 4.89 + 0.79 | 4.00 + 0.62 | 6.14 + 0.67 ^a |
| Contextual skills | 9.00 + 0.97 | 7.38 + 1.09 | 10.38 + 0.91 ^a |

T1=Pre-training
T2=Post-Training
T3=Post-Implementation
a significantly different from T2 (p<0.05)
b significantly different from T1 (p<0.05)
c trend from T2 (p<0.10)
d trend from T1 (p<0.10)

Several change scores were negative at T2, indicating lower scores after training (Table 2). Independent samples t-tests were conducted on change scores (T1→T2; T1→T2/T3) between the two groups. No significant difference in change scores from T1→T2 between the two groups was detected. However, when comparing changes scores for the training only (T1→T2) with the implementation (T1→T3) groups, the implementation group had significantly higher cooking attitudes, ecSI (p-value), eating attitudes (p-value), and contextual skills (p-value) change scores (Table 2).

Paired t-tests were also conducted on change scores between T1→T2 and T2→T3 in the implementation. The ecSI and each of the individual four constructs had negative change scores between T1 and T2; however, these scores became positive between T2 and T3. Four of these scores suggest significant ($p \leq 0.05$) improvement (Table 3). Results suggest implementation of the curriculum had the greater impact on the ecSI score and its four constructs.

Analysis of variance (ANOVA) with Tukey’s post-hoc analyses were conducted on T2→T3 change scores to investigate the influence of demographic factors on post-implementation change scores. No significant differences or trends were observed for change scores (self-efficacy, eating competence, eating attitudes, food acceptance, internal regulation

and contextual skills) by demographic factors (educator role, number of years teaching, technology skills, class schedule type and number of teaching roles).

Table 2: Independent T-Tests of Change Scores by Group

| Change Score Variable | Training Only Group (n=14) T1→T2 | Implementation Group (n=10) T1→T2 | <i>p</i> |
|--------------------------|--|---|----------|
| Self-Efficacy | 0.71 ± 2.86 | 3.57 ± 8.29 | 0.69 |
| Cooking Skills | 0.20 ± 0.85 | -1.84 ± 2.92 | 0.40 |
| Cooking Attitudes | -1.07 ± 2.97 | 7.14 ± 5.44 | 0.16 |
| ecSI | -2.07 ± 1.90 | -6.17 ± 3.40 | 0.28 |
| Eating Attitudes | -0.86 ± 0.75 | -1.29 ± 1.06 | 0.75 |
| Food Acceptance | 0.29 ± 0.41 | -0.43 ± 0.53 | 0.32 |
| Internal Regulation | 0.07 ± 0.45 | -1.50 ± 1.18 | 0.14 |
| Contextual Skills | -1.57 ± 0.69 | -2.43 ± 1.19 | 0.51 |

| Change Score Variable | Training Only Group (n=14) T1→T2 | Implementation Group (n=10) T1→T3 | <i>p</i> |
|--------------------------|--|---|-------------|
| Self-Efficacy | 0.71 ± 2.86 | 8.89 ± 6.86 | 0.22 |
| Cooking Skills | 0.20 ± 0.85 | 3.86 ± 4.15 | 0.43 |
| Cooking Attitudes | -1.07 ± 2.97 | 16.11 ± 6.60 | 0.01 |
| ecSI | -2.07 ± 1.90 | 5.89 ± 2.97 | 0.03 |
| Eating Attitudes | -0.86 ± 0.75 | 2.00 ± 0.97 | 0.03 |
| Food Acceptance | 0.29 ± 0.41 | 1.44 ± 0.87 | 0.25 |
| Internal Regulation | 0.07 ± 0.45 | 1.44 ± 1.14 | 0.21 |
| Contextual Skills | -1.57 ± 0.69 | 1.00 ± 0.78 | 0.03 |

p-values calculated at CI (.95)

Table 3: Paired T-Test of Change Score for Implementation Group Time Points

| Variable | T1→T2 | T2→T3 | <i>p</i> |
|--------------------------|---------------------|---------------------|-----------------|
| Self-Efficacy | 8.33 ± 8.03 | 3.33 ± 1.05 | 0.59 |
| Cooking Skills | -1.84 ± 2.92 | 5.71 ± 3.28 | 0.15 |
| Cooking Attitudes | 7.14 ± 5.44 | 11.43 ± 7.38 | 0.74 |
| ecSI | -6.17 ± 3.40 | 10.00 ± 2.44 | 0.01 |
| Eating Attitudes | -1.29 ± 1.06 | 3.00 ± 1.05 | 0.05 |
| Food Acceptance | -0.43 ± 0.53 | 1.71 ± 0.61 | <0.00 |
| Internal Regulation | -1.50 ± 1.18 | 2.17 ± 1.01 | 0.06 |
| Contextual Skills | -2.43 ± 1.19 | 3.14 ± 0.67 | 0.02 |

p-values calculated at CI (.95)

Discussion

Greater change in pre- to post-scores for cooking attitudes, overall eating competence, and three of the four eating competence constructs occurred among those who took part in both the training and the implementation versus the training only. Moreover, these scores improved for the smaller implementation group, but did not improve for the training-only group. These results suggest experiential learning (implementation) may have been impactful, which is consistent with other research using ELT (D'Adamo et al., 2016; Dudley et al., 2015).

Improving eating competence has cognitive, behavioral, and social implications. Lohse and others (2017) determined specific behaviors and attitudes were associated with varying levels of eating competence: A person dissatisfied with their weight was 54% less likely to be a competent eater. Further, individuals with higher eating competence have significantly lower risk for cardiovascular events (Psota et al., 2007), are more likely to experience positive body satisfaction and improved weight management, and are more likely to meet dietary intake and physical activity recommendations (Stotts & Lohse, 2007). As the FCS classroom is often the venue for nutrition education, FCS educators need to be informed in these areas to model and guide behaviors of their students, as well as benefit their own health. Research has previously suggested experiences with challenges, discoveries, and reflections enable educators to deliver relevant educational material more effectively (Rehm, 2006).

The eating competence constructs, developed by Satter (2007), were based on clinical observations and treatment of disordered eating behaviors. They are particularly relevant given the prevalence of disordered eating patterns in today's society, which often lead to both underweight and overweight conditions (Le Grange, Swanson, Crow, & Merikangas, 2012). These conditions both have similar deleterious health implications such as increased risk for body dissatisfaction, body dysmorphia, and eating disorders (Clifford et al., 2015; Reba-Harrelson et al., 2009); increased smoking and alcohol use (Vurbic et al., 2015); cardiovascular events including heart attack and atrial fibrillation (Flegal, Graubard, Williamson, & Gail, 2005; Kang et al., 2016); renal disease (Fotheringham, Weatherley, Kavar, G. Fogarty, & Ellam, 2014; Sato et al., 2013); and increased years of work and life lost (Brown, Mishra, Kenardy, & Dobson, 2000; Fontaine, 2003).

In the current study, eating competence and the four individual construct scores among the training-only group were similar to eating competence scores previously reported in other studies. Scores for the implementation group were much lower than previously reported scores at T1 and T2, and similar or higher at T3 (Contento, Koch, Lee, Sauberli, & Calabrese-Barton, 2007; Lohse et al., 2007; Psota et al., 2007; Stotts & Lohse, 2018). The implementation group experienced a significant improvement in overall eating competence, eating attitudes, food acceptance and contextual skills.

Greene et al (2012) reported no significant change in eating competence following a 10-week online nutrition education intervention program. The significant change in eating competence identified through the current study may be related to the use of ELT strategies. Results of the paired t-tests on raw scores between T1→T2 for the training-only group, and T1→T3 for the implementation group indicate the training-only group exhibited just one significant change (in contextual skills) while the implementation group had significant improvement in all eight of the survey tools (healthy eating self-efficacy, cooking skills and attitudes, overall ecSI, and the four individual constructs). These results suggest implementation of learned material is the catalyst for behavior and attitude change, which is consistent with other research using experiential learning approaches (D'Adamo et al., 2016; Dudley et al., 2015).

Self-efficacy related to healthy eating and cooking has been shown to improve in educators after completing experiential learning activities (Diker et al., 2013). Improving self-efficacy, healthy behaviors, cooking skills, and attitudes of nutrition educators benefit both students and educators. Current recommendations suggest implementing behavior-based interventions to help students achieve a healthy lifestyle (Dietary Guidelines Advisory Committee, 2015). Thus, educators need to implement ELT strategies, which include experiential learning activities actively engaging students in the behavior change process.

Interestingly, scores for cooking attitudes, overall ecSI, eating attitudes, food acceptance, and contextual skills decreased between T1 and T2 (negative change scores) indicating lower self-efficacy, skill, or competence among both groups. It is possible participants were over-confident and/or not familiar with the constructs measured by the survey tools. For example, during the hybrid training, educators were introduced to the constructs of the eating competence model and mindful eating. These were possibly new concepts for the educators and post-training scores (T2) may have reflected an enhanced appreciation and understanding of these constructs, thus the lower scores. Similar to the paired t-tests in the implementation group, a number of change scores between the training only and implementation groups were significantly different ($p \leq 0.05$) or trended ($p \leq 0.10$). The significantly higher changes detected for cooking attitudes, ecSI, eating attitudes and contextual skills in the implementation group support previous research showing the positive impact of ELT on nutrition knowledge, behaviors and attitudes (Jarpe-Ratner, Folkens, Sharma, Daro, & Edens, 2016; Diker et al., 2013; Parmer et al., 2009; Scogin et al., 2017), and further support use of ELT as a model for PD.

Change scores did not appear to be impacted by demographic differences, such as teaching role, years teaching, technology skills or class schedule type. This may be due to the small sample size and lack of diversity in the sample. Although not significant, change scores observed in educators with more than 20 years of teaching experience were greater than those observed in educators with less than 20 years. This result was unexpected, particularly for cooking attitudes, cooking skills, and nutrition self-efficacy. These results may indicate this population's interest in learning new material or benefits resulting from experiential PD opportunities. These results also support conclusions from the National Center for Education Statistics, which reported CTE educators as more likely to: 1) participate in field-specific PD; 2) seek new information/training after completing field-specific PD; and 3) change teaching practices based on that information and training (US Department of Education, 2000).

Limitations

The ability to generalize these findings to other educator populations is limited due to a non-diverse, small sample, the researchers' limited ability to assess curriculum protocol adherence, and the use of self-report data. Participants in this study were a convenience sample of FCS educators teaching primarily in rural locations in a Midwest state. Although preferred for qualitative investigation, conclusions based on convenience samples typically cannot be generalized to other, larger populations.

Less than half of the participants chose to implement the lessons. Additionally, adherence to curriculum protocol could not be guaranteed as the researchers had no physical contact with participants, their classrooms or their teaching materials. Further, all data collected was self-report, which has inherent limitations. Finally, components of this curriculum, such as introducing, discussing and measuring eating competence, required participants to be insightful,

highly self-aware and honest with themselves and the researchers. This is a challenging task even with extensive training.

Conclusion

Educators' comfort and willingness to implement new learning material and strategies in the classroom varies by educator. This is particularly relevant for nutrition education, which is a relatively new area of science and continues to evolve. Providing FCS educators with topic-based PD affords them the latest research-based tools to inform their teaching practices, encourages growth in their field of study, and facilitates positive changes in behaviors and attitudes of their students.

Content-specific opportunities to fulfill PD requirements for FCS educators are lacking. Moreover, availability and accessibility of PD opportunities can be limited due to geographical location/residence of the educator relative to the PD being offered, or the modality of the PD being offered. However, results from this study and others indicate ELT as a model for hybrid (combination of online and face-to-face) PD is an effective method for increasing nutrition self-efficacy and other positive health behavior outcomes of participating educators. Active and experiential learning models strengthen teaching and learning among the four core concepts of FCS: Basic Human Needs, Individual Well-Being, Family Strengths, and Community Vitality.

More research is needed regarding assessment of knowledge, skills, self-efficacy, perceptions, behaviors and teaching practices of the current generation of FCS educators and their classrooms. This information is necessary when designing field-specific PD opportunities for these educators. PD opportunities should utilize ELT to maximize the desired teaching and learning outcomes.

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Citation

Lavalley, J.R.M. & Litchfield, R.E. (2019, Summer). Nutrition nuggets for the FCS classroom: an experiential approach to professional development. *Journal of Family and Consumer Sciences Education*, 36 (1), 1-14.

Acknowledgements

The authors would like to thank the Iowa State University Human Sciences Extension and Outreach Nutrition and Wellness specialists for their involvement in participant recruitment and workshop facilitation. Additionally, thanks to Isaac Agbemafle for statistical analysis support.