



In-Service Needs for Educational Processes Skill Training of U.S. Food Safety Extension Educators

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Abstract

Food safety is a concern with vast implications, and one way to address this is to educate public on food safety practices. Cooperative Extension System (CES) in the United States (U.S.) is one of the most reliable food safety education providers. Extension educators in the CES are primarily hired for technical subject matter expertise; however, to make educational programs more effective, extension educators should be equally competent in educational process skills. This study identified the in-service needs for educational processes skill training of food safety extension educators in the CES of the North Central Region. The findings indicated a need for skill development in five food safety educational process topic areas: needs assessment, program planning, learning systems, delivery systems, and evaluation systems. The authors recommend that CES's food safety in-service programs should include training in these areas. This study has implications for designing in-service workshops for food safety extension educators.

Key words: Extension Educator, Professional development, Curriculum development, Capacity-building, Competencies.

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INTRODUCTION & REVIEW OF LITERATURE

Food borne illnesses are increasing throughout the world (Motarjemi & Kaferstein, 1999), and represent a major health threat in both developing and developed countries (De Waal & Robert, 2005). World Health Organization (2007) reported that 1.8 million people died worldwide in 2005 due to diarrheal diseases caused by a lack of food and water safety. In the United States (U.S.), one in four persons suffers a foodborne illness annually (Guion, Simonne, & Eaton, 2004). The Centers for Disease Control and Prevention (2007) has reported that 76 million cases of foodborne diseases occur annually in the U.S. resulting in 325,000 hospitalizations and 5,000 deaths.

Food, water, and air are equally needed for survival, but only “Eating could very well be called America’s national pastime” (Pennsylvania Impact, 1999, p. 1). The American government invests monetarily and strategically towards food safety, yet food related illnesses remain widespread (Ellis, 2006; Nyachuba, 2010). In addition to health, foodborne illnesses also have severe economic implications. Guion et al. (2004) reported that a single outbreak of a foodborne illness in a metropolitan area can cause losses of up to \$7 million for a chain of foodservice operations. For small businesses such a cost could challenge their very survival (Guion et al., 2004). Consequently, food safety is a legitimate problem in the U.S. (Barton & Barbeau, 1992). One of the ways to address this problem is to educate the public on the various food safety practices.

The average American is not knowledgeable regarding food safety (Altekruse, Steet, Fein, & Levy, 1995), a scientifically complex issue whose underlying principles are not properly understood by the general public (Barton & Barbeau, 1992). As a consequence, effective food safety educational programs are needed (Nyachuba, 2010) as well as competent educators to educate the public on food safety. Of the organizations that offer food safety educational programs in the U.S., the CES, “...a land-grant university-based outreach and educational organization...” (Franz, Stovall, & Owen, 2010, p.434) is considered the most reliable owing to its research support from land-grant universities (McDowell, 2001). CES’s reliability is further validated by research findings that indicate the impact of food safety educational programs conducted by CES in bringing about changes in food safety behaviors (Gentry-Van Laanen & Nies, 1995; Wardlaw, 1999), improvement in knowledge (Laminack, Dainello, Vestal, & Wingenbach, 2008), and adoption of recommended food safety practices (Dean et al., 2008).

To maintain its status as the most reliable food safety education provider, the CES needs extension educators who are not only skilled in technical subject matter but also in the utilization of various educational processes. Peters (2002a) stated that in addition to diffusing technical subject matter information and helping clients apply the information, the CES also needs to engage in *educational organizing* (Peters, 2002b) which requires process, facilitation, coaching, problem solving, and planning skills. Ghimire (2010) echoes this statement, stating that expertise in utilizing educational processes for conducting programs is equally important to content expertise for making the process of learning more effective. The Theory of Expert Competence purports that the knowledge domain is only one of the five factors associated with the competence of experts (Shanteau, 1992), implying that the technical subject matter expertise of educators by itself is not sufficient for the delivery of effective food safety educational programs.

Ghimire (2010) found that competence in educational processes such as needs assessment and program development, learning systems, delivery systems, and evaluation systems is important for extension professionals to be successful at their work. Similarly, You, Extension and Success! (YES), a competency-based professional development framework developed by the Texas Extension Service, has identified program development and evaluation as required competencies for extension educators (Stone & Coppernoll, 2004). Iowa State University Extension (2009) identified educational programming, education delivery, program prioritization and planning as core competencies required by extension professionals globally. Despite this emphasis on the importance of the educational processes, the literature suggests that extension educators in the CES could benefit from in-service education in the educational process skills.

Bailey and Deen (2002); Chapman-Novakofski et al., (1997); Jayaratne, Lyons, and Palmer (2008) found that extension educators in CES do not have a strong background in evaluation, and hence needed training on evaluation methodologies (Radhakrishna & Martin, 1999). Similarly, in a study conducted by Gibson and Hillison (1994) with North Carolina CES professionals, competence in program planning and the educational processes were perceived to be important for conducting educational programs. They found that extension agents were in need of education in the educational processes. On a similar note, Radhakrishna (2001) found that Clemson university specialists were in need of in-service education on conducting needs assessments. Schwarz and Gibson (2010) identified the needs of extension professionals in the CSREES listserv entitled AQUA-EXT and found that they needed training in areas like program evaluation and web-based education programming. Specifically, extension agents perceived a greater need in the educational processes related to teaching adults. Conklin, Hook, Kelbaugh, and Nieto (2002) found that extension professionals of the Ohio State University had a greater need for training in topics outside of their technical subject matter. Further, Morford, Kozak, Suvedi, and Innes (2006) stated that there is a high variability among extension practitioners’ evaluation practices from person to person and from state to state in the CES, and as a result recommended training programs to increase the confidence of extension educators in conducting program evaluations.

A similar situation exists for extension educators around the world. Alawy and Safrit (1994) identified that extension agents in developing countries received more training in technical subject matter than in teaching processes and delivery skills. Moyo and Hagmann (2000) opined that extension educators should be competent in both technical subject matter and process skills. Belay and Abebaw (2004) found that Ethiopian extension workers do not possess practical and communication skills to the desirable level and suggested hiring extension professionals trained in extension methods. Similarly, Iranian extension agents and specialists expressed a need for

competence in needs assessment, program planning and evaluation (Pezeski-Raad, Yoder, & Diamond, 1994). Similar results were achieved by Tladi (2004) in a study conducted on agricultural extension agents of South Central Botswana. In another study, Androulidakis, Siardos, and Crunkilton (1995) found that Greek extension agents were not adequately trained in extension methodology to perform their job duties properly.

Ghimire (2010) found that extension educators prefer to learn educational process competencies while on the job indicating the importance of in-service education in imparting these skills and, consequently, the importance of designing in-service curriculum to include training in not only technical subject matter but also in educational processes. In order to conduct such in-service education workshops it is important to first identify the educational process needs of extension educators, which is the focus of the study detailed in this paper. This study identified the in-service needs for educational processes skill training of food safety Extension Educators in the CES of the North Central Region (NCR) of the U.S. There are no known research studies in either the U.S. or globally that have researched this aspect of food safety education.

THEORETICAL FRAMEWORK

Icek Ajzen's Theory of Planned Behavior (TPB) served as the theoretical framework for this study. According to the TPB, a person's intentions to perform behaviors can be predicted from three variables: attitudes toward the behavior, subjective norms, and perceived behavioral control. Intentions and perceived behavioral control are the major factors influencing a person's actual behavior (Ajzen, 1991). Attitude toward a behavior is the value placed in performing that behavior while the subjective norm is the perceived social pressure whether or not to engage in that behavior, and perceived behavioral control is a person's perception of his/her ability to perform a given behavior (Ajzen, 2006).

The attitude of extension educators toward in-service education and subjective norm (program requirements, office policies for in-service education etc) are important influencers of extension educators' behavior related to participating in in-service education. This study was conceptualized on the variable *perceived behavior control* from TPB (Figure 1). It was conceptualized that extension educators could perceive the extent of need for in-service education based on their current skill levels in the five educational processes. These perceptions about their abilities which influence behavioral traits like attending in-service workshops when combined with intentions to get trained in the educational process skills would eventually translate into behavior related to attending in-service workshops and wanting to have newer and better instructional materials.

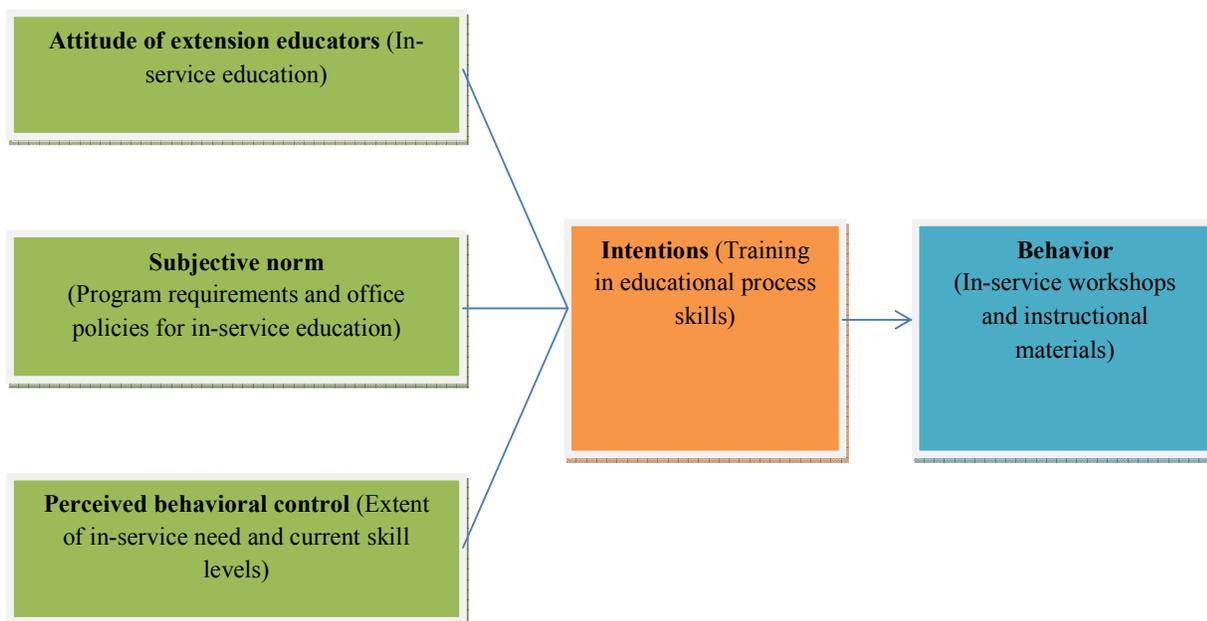


Figure 1: Conceptual Framework for the Study

PURPOSE AND OBJECTIVES

The purpose of this study was to analyze the in-service needs for educational processes skill training of food safety extension educators in the CES of the NCR of the U.S. The study had the following objectives:

1. To identify the demographic characteristics of the extension educators.
2. To identify extension educators' perceived in-service needs for skill training in the identified food safety educational process topic areas.
3. To compare the perceived in-service needs for educational processes skill training of food safety extension educators across the member states of the NCR.

METHODS

The Institutional Review Board at the Iowa State University approved this study. A descriptive cross-sectional survey design was used for this study. The population for this study was drawn from the NCR and consisted of all extension educators in the program area of Family and Consumer Sciences (FCS), all extension educators in the program area of Agriculture and Natural Resources (ANR), and all the County Extension Directors (CED). CEDs were included because most had job responsibilities in more than one program area. The extension educators in ANR were selected as aspects related to farming affect food safety and some of the education programs these educators offer may be related to food safety. While 4-H extension educators offer educational programs in food safety to youth they were not included as this study focused on adult educational processes. This study is a part of a larger dissertation study conducted on the food safety educational processes in the CES of the NCR.

Probability sampling procedure was used and a disproportional stratified random sample was drawn from the total population. Population sizes were different among the 12 member states of the NCR. Therefore, disproportional stratified sampling procedure was used to select equal number of extension educators from each state. Equal number of extension educators from each state were needed to facilitate comparison of the perceived in-service needs of extension educators across the member states of the NCR, which served as one of the objectives of this study. The formula for calculating sample size as suggested by Ary, Jacobs, Razavieh, and Sorenson (2006, p.419) was used to arrive at a sample size of 384. Anticipating a 50% return rate (Ary et al.), 64 extension educators were randomly selected from each of the 12 states of the NCR yielding a sample size of 768 extension educators. The 12 member states of the NCR include Illinois, Indiana, Iowa, Kansas, Michigan, Minnesota, Missouri, Nebraska, North Dakota, Ohio, South Dakota and Wisconsin. An electronic questionnaire developed using SurveyMonkey® and modeled on questionnaires used by Creswell (1990), Jayaratne (2001), Kwaw-Mensah (2008), and Walczyk and Ramsey (2003) was used for this study. This format of survey questionnaire was used because the researchers had previous success conducting a similar study with agriculture teachers (Koundinya & Martin, 2010).

The in-service needs for the educational processes skill training were identified using a five point Likert-type scale that ranged from 0= *None (N)* to 4= *Very high need (VHN)*. Demographic information was identified using both open and close-ended questions. Five food safety educational process topic areas - needs assessment, program planning, learning systems, delivery systems, and evaluation systems - were identified based on the framework for research in adult education developed by the North Central Region-158 Committee on Adult Education in Agriculture (NCR-158 Committee on Adult Education in Agriculture, 1990). To give clarity to what topics are suitable for each of these five educational process topic areas some example topics were included in the questionnaire. The topics included: different methods of needs assessment under the Needs Assessment topic area; participatory planning, developing an action plan and writing reports under Program Planning topic area; learning styles and principles of adult learning under the Learning Systems topic area; how to use the different teaching tools and methods, delivery techniques and developing instructional materials under the Delivery Systems topic area; and different evaluation methodologies and developing survey instruments for evaluation under the Evaluation Systems topic area. These example topics were developed based on a review of literature, expert panel suggestions, and the authors' personal experiences with Extension systems. Furthermore, a provision was given to extension educators to identify any additional educational process competencies that they felt were important and out of the purview of the five identified educational process topic areas.

The questionnaire was validated by an expert panel for face, content, and construct validity. The panel consisted of professors from the departments of agricultural education, food science and human nutrition; CES state program leaders in the program areas of FCS and ANR; and the Director of Extension at the Iowa State University. The questionnaire was pilot-tested with extension educators with the resulting data used to establish the reliability of the questionnaire. The extension educators that participated in the pilot test were excluded from the final survey population to prevent a contaminated sample. For reliability of the questionnaire, Cronbach's α was

computed from the data collected in the pilot test. A value of 0.952 was reported for this section of the questionnaire that consisted of these five in-service need areas representing the educational processes. This value is categorized as ‘excellent’ reliability by George and Mallery (2003). The ex post facto reliability was also high 0.893.

Selected extension educators were emailed a letter informing them of the purpose of the research. This letter sought their cooperation and it was made clear that their participation in this study was voluntary and they could withdraw at any time. They were also informed that any changes in the study’s objectives would be communicated to them. Extension educators did not receive any monetary incentive for participating in this study. After this introductory email, the survey questionnaire was emailed to them. Extension educators’ consent for the study was assumed if they filled out the questionnaire. Four follow-ups were conducted at suitable time intervals and a log of important events was maintained throughout the research process.

A potential limitation to this study was the response rate (42.31%). According to Lindner, Murphy, and Briers (2001) any response rate of less than 85% could result in significant differences between early and late respondents, thus affecting the external validity of the study. One method to account for non response error entails comparing early and late respondents (Dooley & Lindner, 2003; Miller & Smith, 1983). This method was followed and the low response rate limitation was accounted for by comparing early and late respondents using an independent samples *t*-test. No statistically significant differences in any of the five identified food safety educational process topic areas were found at the 0.05 level of significance, suggesting that the results could be generalized to non-respondents and the total population. As a result, the potential limitation imposed by the response rate was no longer considered as a reasonable threat to the external validity of this study.

Descriptive statistics such as frequencies, means and standard deviations were used for presenting the extent of in-service need on the five identified educational processes. Inferential statistics such as independent samples *t* test was used to compare early and late respondents. One way analysis of variance (ANOVA) was used to test for any statistically significant differences in the in-service needs of extension educators by state. Since five variables were compared using ANOVA, a Bonferroni correction factor was applied with the significance level (α) set at 0.01 (0.05/5).

FINDINGS

Seven hundred sixty-eight extension educators received the survey. Four hundred sixteen responded to the questionnaire for an initial response rate of 54.16%. Only 325 questionnaires were usable, yielding a response rate of 42.31%. The questionnaire used for the bigger study of which this study is a part had five major sections, and the questionnaires that had any one full section unanswered were considered unusable. The findings are presented below for each objective.

Objective 1: To Identify the Demographic Characteristics of The Extension Educators

The respondents had a mean work experience of 14.86 years, with a standard deviation (SD) of 10.04. Work experience ranged from 1-40 years. The respondents ranged from 24-73 years of age. The mean age of the respondents was 48.62 years with a SD of 10.85. Since outliers were detected in the age category, a median was calculated to account for the skewed distribution. The median age of the respondents was 51 years indicating that the age distribution was negatively skewed. Fifty-six percent of the respondents were female and 61.88% had earned a Master’s degree.

These findings are consistent with the findings of Camara (2006); Creswell (1990); Jayaratne (2001); Kwaw-Mensah (2008); Radhakrishna and Thomson (1996) regarding the variables of age, educational level, and work experience; and with the findings of Webster, Rogers, and Mariger (2001) regarding age but not in gender distribution. All six studies reported here found that a majority of the extension educators that participated in their studies were males. Braiser, Barbercheck, Kiernan, Sachs, Schwartzberg, and Trauger (2009); Ghimire (2010); Selby, Peters, Sammons, Branson, and Balschweid (2005), however, found that a majority of extension educators in their research samples were females.

Objective 2: To Identify Extension Educators’ Perceived In-service Needs for Skill Training in the Identified Food Safety Educational Process Topic Areas

Frequency distribution, Mean and *SD* scores were calculated for the need for in-service education covering the five identified food safety educational process topic areas. Results showed that to more effectively conduct their food safety educational programs, extension educators needed in-service education on all five topic areas (Table 1). All the educational process topic areas recorded mean scores between *Some* (2.00) to *High* (3.00) need.

Table 1: Extension Educators' Perceived In-Service Needs for Educational Processes Skill Training

Educational Process Topic Area	<i>f</i>					<i>M</i>	<i>SD</i>	<i>n</i>
	0	1	2	3	4			
Needs assessment	13	59	142	77	30	2.16	0.96	321
Program planning	17	82	118	80	24	2.03	1.00	321
Learning systems	20	65	129	78	29	2.09	1.02	321
Delivery systems	14	52	90	113	52	2.42	1.07	321
Evaluation systems	8	43	90	112	67	2.58	1.04	320

Note. 0= No need, 1= Low need, 2= Some need, 3= High need, 4= Very high need

These results are in line with the findings of Gibson and Hillison (1994); Chapman-Novakofski et al., (1997); Radhakrishna and Martin (1999); Radhakrishna (2001); Bailey and Deen (2002); Conklin, Hook, Kelbaugh, and Nieto (2002); Jayaratne, Lyons, and Palmer (2008); Schwarz and Gibson (2010).

Objective 3: To Compare the Perceived In-service Needs for Educational Processes Skill Training of Food Safety Extension Educators Across the Member States of the NCR

Mean and SD scores on the perceived in-service needs of extension educators on all of the five identified food safety educational process topic areas were calculated state-wise. Of the 60 mean scores presented in Table 2, 11 had mean scores between 1.00 and 2.00 indicating a “Low” to “Some” inservice need and two had mean scores of ≥ 3.00 indicating a “High” to “Very High” inservice need. The remaining 47 had mean scores between 2.00 and 3.00 indicating that overall these extension educators had “Some” to “High” need of in-service education.

Table 2: Extension Educators' Perceived In-Service Needs for Educational Processes Skill Training by State

State	Educational Process Need Area									
	Needs assessment		Program planning		Learning systems		Delivery systems		Evaluation systems	
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>
Illinois	2.23	1.06	2.19	1.02	2.30	1.01	2.30	1.04	2.88	1.07
Indiana	2.45	0.72	2.25	0.89	2.25	0.85	2.48	0.92	2.67	0.97
Iowa	2.09	1.08	1.93	1.18	2.12	1.23	2.46	1.21	2.41	1.08
Kansas	2.36	0.95	2.36	0.89	2.47	0.84	3.05	1.12	3.00	1.00
Michigan	2.00	1.01	1.96	0.92	2.00	1.11	2.33	1.09	2.66	1.06
Minnesota	2.03	1.08	2.03	1.01	1.93	1.16	2.13	1.18	2.34	1.11
Missouri	2.00	0.97	1.83	1.11	1.81	1.07	2.18	1.04	2.29	1.10
Nebraska	2.30	0.92	2.20	0.95	2.55	0.88	3.00	0.72	3.00	0.79
North Dakota	2.10	1.13	1.82	1.02	2.00	1.05	2.42	1.23	2.42	0.99
Ohio	2.10	0.87	1.40	0.96	1.80	0.91	1.90	1.19	2.00	1.15
South Dakota	2.19	0.70	2.25	0.89	2.16	0.82	2.58	0.84	2.70	0.93
Wisconsin	2.17	0.98	1.96	0.99	1.89	0.95	2.32	0.98	2.57	0.99

Note. 0= No need, 1= Low need, 2= Some need, 3= High need, 4= Very high need

The findings presented in Table 2 indicated that there may be no statistically significant differences between the perceived inservice needs of extension educators from the 12 states. However, a one-way analysis of variance (*ANOVA*) was computed to statistically validate the findings in Table 2. No statistically significant differences were recorded in the in-service needs for educational processes skill training of extension educators from the different states (Table 3).

Table 3: One-way ANOVA for the in-service needs for educational processes skill training of food safety extension educators by state

Source of variation	df	SS	MSS	F	P
Needs assessment Area					
Between groups	11	6.454	0.587	0.618	0.813
Within groups	309	293.123	0.949		
Program Planning Area					
Between groups	11	13.715	1.247	1.236	0.262
Within groups	309	311.836	1.009		
Learning Systems Area					
Between groups	11	15.336	1.394	1.343	0.199
Within groups	309	320.671	1.038		
Delivery Systems Area					
Between groups	11	23.130	2.103	1.870	0.043
Within groups	309	347.400	1.124		
Evaluation Systems Area					
Between groups	11	19.696	1.791	1.692	0.074
Within groups	308	326.026	1.056		

*P< 0.01

These findings are comparable to the studies of Morford, Kozak, Suvedi, and Innes (2006) who stated that there is a high variability among extension practitioners' evaluation practices from person to person and from state to state, and as a result recommended training programs to increase the confidence of extension educators in conducting program evaluations.

As indicated in the methods section, in addition to the five identified food safety educational process in-service need topic areas, the respondents were asked to identify any additional in-service needs they had related to the educational processes used in conducting food safety educational programs. As a result, two additional in-service training need areas were identified: (1) using new technologies in teaching; and (2) adapting programs to various timeframes. General comments from survey participants relevant to the purpose of this study were also collected. Three groups of comments emerged: (1) extension educators want more in-service education even in the subject matter related to food safety, (2) training now being offered by the land-grant universities is not current, and (3) food safety educators need training in how to teach food safety. The third comment ties in nicely with the objectives of this study and helps indicate that this study is important and needs-based.

CONCLUSIONS

Three major conclusions were drawn from the findings of the study. First, extension educators in the program areas of Family and Consumer Sciences, Agriculture and Natural Resources, and the CEDs in the NCR are mainly middle-aged women with substantial years of work experience and hold a master's degree. Second, these extension educators are in need of in-service education in all of the five identified food safety educational process topic areas of needs assessment, program planning, learning systems, delivery systems, and evaluation systems. And third, since the extension educators perceived a need for in-service education in all five areas, these perceptions may likely translate into behavior as per TPB that served as the theoretical framework for this study. The behavior may be related to attending in-service workshops and acquiring newer instructional materials during those in-services for more effectively educating their clients.

Implications and Recommendations

This study has a variety of implications for extension professionals responsible for designing in-service education programs for food safety extension educators and for extension educators themselves. The point has been made that in-service education for extension educators on the educational processes is an important priority for making the current food safety education program delivery more effective. Hence, it is recommended that training in the educational processes such as needs assessment, program planning, learning systems, delivery systems, and evaluation systems should be provided to food safety extension educators.

The demographic information revealed that a typical extension educator teaching about food safety in NCR is a middle-aged person. This may have implications while designing in-service education as the needs of middle-aged educator may be different from that of a young person especially in terms of use of information and communications technologies. Also, a trend of female extension educators outnumbering male counterparts in NCR was observed from this study. Future research should validate this finding and if this is identified as a changing trend then in-service education programs should be designed keeping this demographic information in mind as females prefer learning through different teaching methods than males. Further, the findings from this study provide guidelines for designing food safety in-service education programs in a holistic way. The five identified educational process topic areas should be used in the curriculum design of in-service workshops for extension educators. Furthermore, more educational process topics than the five identified in this research should be developed and included in the in-service education programs.

There may be some states that may be focusing on some or all of these educational process topic areas while designing in-service workshops but extension educators do not often have formal training in the educational processes. The findings from this study have implications for hiring practices used when attempting to fill professional extension educator positions. It may be appropriate to have these individuals to either demonstrate their educational processes skill set in an interview or have other evidence of knowledge and skills in the educational processes.

This study should be replicated with the food safety extension educators in the other states in the U.S. The identified educational process topic areas could be used in the in-service education of extension educators in other program areas also as they are essential for all extension educators. Literature suggests that similar in-service needs exist for extension professionals from around the world. A similar study may be appropriate in other countries.

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