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Evaluation competencies and challenges faced by early career extension professionals: developing a competency model through consensus building

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ABSTRACT

Purpose: To examine the evaluation competencies extension professionals need to develop and the challenges faced by early career extension professionals when they evaluate their extension education programs.

Design: We conducted two studies that utilized a three round Delphi technique to come to consensus on the core program evaluation competencies for extension professionals and the most pervasive program evaluation challenges early-career extension professionals face. These studies were conducted in the spring and summer of 2018. We used two Delphi panels: (1) 46 evaluation specialists and (2) 30 new county extension professionals from various program areas. We inputted the final list of program evaluation competencies and challenges into a spreadsheet for comparative analysis to achieve the research purpose.

Findings: The panel of extension evaluation specialists reached consensus on 36 competencies and the panel of early career extension professionals had consensus on 26 program evaluation challenges. Comparative analysis of the results of the two Delphi studies effectively linked early career extension program evaluation challenges with the evaluation specialists identified core evaluation competencies.

Practical Implications: We provide a framework for designing needs-based, proactive in-service trainings to build the evaluation capacity of early-career extension professionals.

Theoretical Implications: This program evaluation competency model for early-career extension professionals adds to the overall theoretical body of literature focused on evaluation capacity building of extension professionals.

Originality: It presents the US Extension Evaluation Specialists' national consensus of the core program evaluation competencies for extension professionals. It is also the first study to compare early-career extension program evaluation challenges with a relevant evaluation competency model.

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Introduction

The historical view of the notion of competence is not a novel idea. However, the use of competence in vocational education program development is relatively a novel idea (Mulder, Weigel, and Collins 2007). ‘Competence is the integrated set of capabilities (or competencies); consisting of clusters of knowledge, skills, and attitudes’ required to perform the specified job effectively where as ‘competency is a situational element of competence, which can be; behaviour-oriented and/or; task-oriented; and meaningful in a specific context and at a sufficient level of specification’ (Mulder et al. 2009, 757–758). According to this differentiation, the focus of our study is on evaluation competencies of extension professionals. Evaluation competencies constitute the knowledge and skill set necessary for extension professionals to assess educational programs effectively. Competencies are meaningful only when those are adequately defined and described in the unique context of their application (Mulder et al. 2009).

The use of competency models as the foundation for human resource development is prevalent in the United States and is becoming more popular internationally. Interest in competency-based approach to professional development is growing (Rothwell and Lindholm 1999). Competency building became a priority for those organizations that sought to gain and protect a competitive advantage, which is particularly salient for public organizations that are challenged to respond to external pressures (Vakola, Soderquist, and Prastacos 2007). Competency building models focus on measuring knowledge, skills and abilities needed to carry work responsibilities successfully and provides useful information to develop needs-based training (Harder, Place, and Scheer 2010). Due to this, organizations have used competency models to select proficient individuals for the job and provide professional development in-service trainings (Ennis 2008; Karbasioun 2007). Identifying and building strategic competencies is critical for public organizations to efficiently create appreciable public value for key stakeholders (Bryson, Ackermann, and Eden 2007).

One such organization that uses competency models is the Cooperative Extension Service (Extension) in the United States (Harder, Place, and Scheer 2010). Extension represents the largest non-formal educational system that works with both rural and urban communities by disseminating research-based knowledge to improve the quality of life of its people (Franz and Townson 2008; Rasmussen 1989; Rogers 1992; Seevers and Graham 2012). Extension professionals are the front-line workers who design and implement educational programs at the grassroots level to solve the problems of their clientele (Seevers and Graham 2012). The initial adoption of the competency approach towards professional development within Extension manifested from observations from other industries regarding their ability to enhance organizational significance and the capacity to provide meaningful educational programming (Harder, Place, and Scheer 2010).

Now competency models are commonplace in international extension and used as a means to inform professional development (Harder, Place, and Scheer 2010). For example, the Kentucky Cooperative Extension System has a Career Stage Competency Model (Rennekamp and Nall 1994), the Ministry of Agriculture in Iraq has the Agriculture Extension Competency Profile (Karbasioun, Mulder, and Biemans 2007), Texas AgriLife Extension has the YES! Model (Stone and Coppernoll 2004), The Republic of Kenya has the Pluralistic Farm Group Extension Competency Model (Davis et al. 2004), Michigan

State University (2008) developed a Core Competency Initiative, and 4-H developed the 4-H Professional, Research, Knowledge and Competencies (PRKC) model (Stone and Rennekamp 2004). Additionally, Feed the Future program developed core competencies for agricultural extension professionals in Nepal (Suvedi and Ghimire 2015). These models included several critical skill sets related to the focused extension competency development.

One commonality in all these extension competency models is the identification of program evaluation as a core competency domain. The models explicitly outline the importance of program evaluation for making programmatic improvements and demonstrating accountability (Michigan State University 2008; Rennekamp and Nall 1994; Stone and Coppernoll 2004; Stone and Rennekamp 2004; Suvedi and Ghimire 2015). However, these models typically outline the competency criteria for program evaluation in a broad sense excluding specific competencies within program evaluation to guide related competency building and assessment efforts.

The majority of evaluation competency research focused on professionals whose primary responsibility is evaluation (Stevahn et al. 2005; CES 2010). This represents a gap in the research requiring additional exploration to identify the core competencies required by professionals who use evaluation as one part of their job portfolio (Froncek et al. 2018; King and Stevahn 2015). Rodgers et al. (2012) served as pioneers to develop a competency model for extension professionals, utilizing the evaluation taxonomy developed by Ghere et al. (2006). The competencies outlined by Ghere et al. (2006) served as a model for professional evaluators, requiring adaptation to fit the non-formal education context seen in extension. As a result, Rodgers et al. (2012) developed a taxonomy for assessing evaluation competencies in extension with 48 competencies across three competency domains: situational analysis, systematic inquiry, and project management.

While this exploratory model set the stage for program evaluation competency models in extension, the scope of the study used to inform its development limits and broader applicability. The validation and pilot-test of the instrument only included extension faculty and staff from the state of Michigan, United States, making its generalizability somewhat limited. This limitation highlights the need to revisit the competency framework for extension program evaluation to identify the knowledge, skills, and attitudes needed for successful evaluative efforts across broad extension systems.

An evaluation competency framework with broader applicability holds promise for designing initial onboarding training programs, thus allowing for the opportunity to strategize successful evaluation capacity building approaches. Onboarding programs are typically utilized to familiarize new employees with the organization and develop essential competencies central to their initial job functions. The findings of Bengé, Harder, and Goodwin (2015) demonstrate how addressing early-career evaluation challenges in these training programs are critical towards mitigating the increasing rates of extension professional attrition. According to Lamm, Israel, and Diehl (2013) when on boarding training programs are not successful, the problem initiates with early career extension professionals demonstrating underdeveloped evaluation competencies that undermine the evaluation activities conducted in extension. In their national study, they found most extension professionals only administer post-test following an educational activity, focused on measuring participation and customer satisfaction. This is the salient issue for early career extension professionals that typically do not have a background in

program evaluation. Extension professionals' lack of expertise limits their ability to measure long-term impacts and demonstrates a significant need related to evaluation planning, data collection, and analysis (Lamm, Israel, and Diehl 2013).

Competency development and extension education evaluation

McClelland (1973) used the term competency to describe the characteristics that encompass and predict workplace performance. He provided a new direction to professional development through a competency framework built upon four key factors: (1) performance criteria developed related to life outcomes including occupation; (2) assessments designed to reflect changes from learning; (3) making readily available the information necessary to improve competencies; and (4) use of observable and realistic performance measures. McClelland (1973) underpins this approach through the assertion that to understand job performance, employees should be evaluated based on criteria associated with job responsibilities.

Evaluation competencies 'are defined as the essential knowledge, skills, and dispositions that evaluators need to conduct program evaluations effectively' (Ghere et al. 2006, 109). Over the last four decades, many evaluators conducting research on evaluation have proposed competency development models. Initial efforts by Kirkhart (1981) defined evaluator competencies categorizing the skills of an evaluator into:

eight major categories: (1) methodological skills, (2) knowledge areas providing substantive background, (3) systems analysis skills, (4) political savvy and understanding, (5) professional ethics, (6) management skills, (7) communication skills, and (8) interpersonal skills or character traits. (Kirkhart 1981, 188–189)

This effort was expanded by Michael Quinn Patton, a leader in the evaluation field, based on his assertion that evaluator competencies should extend beyond just methodological and technical knowledge and skills to include 'communication skills, conceptualization, and program logic capabilities, consulting skills, interpersonal competence, political sophistication, knowledge of how organizations work, creativity, and verbal and written presentation skills (p. 48).' Subsequently, Mertens (1994) conducted a systematic review utilizing multiple resources to develop a model for quality evaluations including knowledge and skills needed for conducting quality evaluations (e.g. people skills, communication skills), and discipline-specific knowledge and skills (e.g. education and health). In addition, Scriven (1996) asserted that evaluators need practical expertise in 'basic qualitative and quantitative methodologies; validity theory, generalizability theory, meta-analysis; legal constraints on data control and access; personal evaluation; ethical analysis; needs assessment; cost analysis; internal synthesis models and skills; conceptual geography, and evaluation-specific report design, construction, and presentation' (p. 160).

In the early 2000s a systematic effort was made to establish evaluation competency frameworks by university researchers and professional societies (Johnson 2018; Wilcox and King 2014). This led to the development of models like the Essential Competencies for Program Evaluators (ECPE) (King et al. 2001; Stevahn et al. 2005), The Canadian Evaluation Society (CES) Competency Taxonomy (CES 2010), The Aoteroa New Zealand Evaluation Association Taxonomy (Wehipeihana et al. 2014; Wilcox and King 2014) and the American Evaluation Association Evaluator Competencies (AEA 2018) that

provide a comprehensive list of competencies for professional evaluators. These efforts raised international awareness for importance of a competency approach to develop capacity inside an organization for quality evaluations and the success of the profession.

Despite the availability of the competency taxonomies for professional evaluators, there is a need for research to develop a competency model that is appropriate for the non-formal education context that extension professionals work in. The evaluation competency models that exist were developed for professional evaluators and do not consider a paradigm where evaluation is only a part of a larger job portfolio. We assert that competency models developed for professional evaluators may not represent a practical and meaningful framework for professionals that have additional job responsibilities like educational program development and delivery. For example, the ECPE model (King et al. 2001) outlines 61 core evaluation competencies, which may not be a reasonable expectation for extension professionals. For that reason, we believe it is important to develop a model that take into consideration balancing evaluation responsibilities with the additional job responsibilities of extension professionals.

The purpose of this study was to examine the evaluation competencies extension professionals need to develop and the challenges faced by early career extension professionals when they evaluate their extension education programs. More specifically this study aimed to achieve the following objectives:

1. Determine evaluation competencies specific to the non-formal education context that extension professionals need to have in order to assess extension programs meaningfully.
2. Determine the challenges faced by early career extension professionals when they assess educational programs.
3. Develop a competency-building framework by aligning each of the needed evaluation competencies with the early career extension professionals' evaluation challenges.
4. Discuss the implications for international extension services.

We believe that by outlining expert consensus and the needs of novice extension professionals, we can identify evaluation training gaps for meaningful competency development in the early career stage of extension educators.

Methods

This article encompasses two separate studies that used a three round Delphi technique (Hsu and Sandford 2007; Linstone and Turoff 1975; Warner 2015) to identify and describe: (1) what extension evaluation specialists believe are core evaluation competencies that should be taught to extension professionals and (2) the most pervasive program evaluation challenges faced by early career extension professionals. Delphi technique is effective in reaching consensus among the group of experts selected purposively (Hsu and Sandford 2007; Linstone and Turoff 1975; Stufflebeam et al. 1985). We utilized online surveys to collect data from the panel and achieve consensus, which may have its limitations that should be considered when reviewing the results of the study. According to Donohoe, Stollefson, and Tennant (2012) this may limit the efficacy of the process as each respondent is left to interpret the list of competencies themselves. To mitigate this

potential issue, we provided the survey to our entire panel prior to each round and made ourselves available for questions and clarifications.

These studies were conducted in the spring and summer of 2018 and were approved by the [University] institutional review board for human subjects. Below we parse out the specific methods used for each respective study.

Evaluation specialist Delphi study

The population of interest for this study was Extension Evaluation Specialists in the US. We selected an expert panel of 46 evaluation specialists with an average experience of more than 12 years representing 31 different states and extension systems in the US. The expert identification process encompassed the review of university websites along with the American Evaluation Association database. Each of the panelists were contacted via telephone prior to launch of the study to discuss the study expectations and address their questions and clarifications. After that, the initial survey was sent for review. Panelists were asked to provide feedback considering existing evaluation competency models and considering competencies that transcended program area and extension system of delivery (i.e. domestic extension, international extension or other non-formal education organizations). Some of the panel members noted their international extension experience as well with their work with extension systems in other countries.

The first round consisted of one open-ended item: 'Please list all of the core program evaluation competencies that are necessary to build the evaluation capacity of extension educators to conduct meaningful evaluations.' Forty-five of the 46 panelists responded to the first round survey with a response rate of 98%.

We used the constant comparative method (Glaser 1965) to analyze the open-ended responses. A three-step process of constant comparative analysis was used to categorize the responses from first round and later developed items for the second-round survey. First, we assessed the data line by line and assigned codes with temporary categories, then we recoded until categories became well-defined. We examined the individual categories to establish meaningful relationships with other categories and subcategories. Through this process, we generated a list of unique evaluation competencies needed for extension agents to assess educational programs. We used group coding throughout this process with three researchers coding together to develop the initial themes that were then disseminated to an external member for review and feedback. This process resulted in the identification of 97 competencies from the first round of responses.

In the second round, we asked the expert panel to rate the level of importance for building each evaluation competency on a 5-point Likert-type scale (1 = *Extremely Important*, 2 = *Very Important*, 3 = *Somewhat Important*, 4 = *Slightly Important*, 5 = *Not Important At All*). We defined consensus *a priori* as 2/3 of the group identifying extremely important or very important regarding developing each competency (Warner 2015). We also provided the opportunity for respondents to identify additional competencies that they did not see on the list but felt was important to include through an open-ended item. With a response rate of 93% (n = 43), the panel demonstrated agreement on 40 competencies and identified one additional competency for inclusion in the third round.

In the third round and final round, we asked the panelists to review the shortened list and rate their level of agreement with the program evaluation competencies being

important to develop among extension professionals on a seven point Likert-type scale (1 = *Strongly agree*, 2 = *Agree*, 3 = *Somewhat agree*, 4 = *Neither agree nor disagree*, 5 = *Somewhat disagree*, 6 = *Disagree*, 7 = *Strongly disagree*). According to Hsu and Sandford (2007), this is an important part of the Delphi process because it allows for the opportunity to record changes in perception. We defined consensus *a priori* as 2/3 of the group identifying strongly agree or agree regarding the importance of developing each program evaluation competency. With a response rate of 89%, we achieved consensus on 36 evaluation competencies that represent a range of knowledge, skills, attitudes and behaviors/practices.

Early-career extension professional Delphi study

For this part of the study, we operationalized a *new extension professional* as someone who had been employed for at least one but not more than three years. The rationale for selecting the extension professionals having one to three years of experience is to ensure that they have exposed to evaluation challenges adequately without going through comprehensive evaluation in-service educational programs. We developed a Delphi panel of new county extension professionals ($N = 30$) from various program areas in three states in the United States (10 from each state). The panel was selected by extension district directors and program leaders. Table 1 outlines the demographics of the panel to include program area and highest education level. While these professionals were not explicitly asked about their international experience, the extension systems that employ them exhibit significant structural and institutional differences. These differences may increase the study's ability to identify challenges that are central to the functionality of program evaluation applicable to various extension systems operating in a vast geographic area resembling the international context of extension systems. The lack of international representation in the Delphi panels may limit the transferability of study findings to some international settings. This limitation of the study should be considered by the reader when applying for an international context.

The first round consisted of one open-ended item: 'Please list all of the program evaluation challenges that you have faced as a newer extension agent. (program evaluation task (s) or situation(s) that really tests your abilities).' The focus of this round was to create a comprehensive list for consideration. This study also used the constant comparative method (Glaser 1965) to analyze its open-ended responses, using the same three-step

Table 1. Early career extension professional expert panel demographics.

	Percentage
Program Areas	
Family and Consumer Sciences	35.7
Agriculture	32.1
Horticulture	14.3
Youth Leadership Development (i.e. 4-H)	10.7
Community and/or Rural Development	3.6
Natural resources and/or Sea Grant	3.6
Highest Education Level	
Bachelor's degree	20.7
Some graduate school	6.9
Master's degree	70.0
Doctoral degree	3.4

process as outlined above for the Delphi study conducted with evaluation specialists. This process resulted in the identification of 36 challenges from the first round of responses.

In the second round, we asked the expert panel to rate the importance of addressing each challenge on a five-point Likert-type scale (1 = *Extremely Important*, 2 = *Very Important*, 3 = *Somewhat Important*, 4 = *Slightly Important* 5 = *Not Important At All*). We defined consensus *a priori* as 2/3 of the group identifying extremely important or very important regarding addressing each program evaluation challenge (Warner 2015). With a response rate of 93% (n = 28), the expert panel demonstrated agreement on 29 challenges and identified one new challenge to be included in the third round.

In the third and final round we asked the panelists to rate each item similar as the second round but with a shortened list of challenges. As previously mentioned, this is an important part of the process that allows to record changes in perception (Hsu and Sandford 2007). With a response rate of 97% (n = 29), we achieved consensus on 26 challenges.

Comparative analysis

We entered the final list of 36 program evaluation competencies identified by the evaluation specialists and 29 evaluation challenges faced by early career extension professionals into a spreadsheet side-by-side and critically analysed evaluation challenges to determine the challenges align with each evaluation competency. We used the AEA and CES evaluation competency models as a guiding framework for analysis, comparison, and organization. We chose these models because these organizations have significant international engagement and represent the most comprehensive and up to date models. The lead author first organized the model based on the research data and it was then verified and refined by remaining authors. Finally, it was sent to the remaining researchers and an external faculty member for review. Final determinations were made based on full group agreement. The product of this analysis is a list of extension evaluation needs and gaps for meaningful competency development in the early career stage of an extension educator.

Results

Below we outline the results for each study in its own section with a final section providing comparative insights of the results.

Evaluation specialists Delphi study results

The panel of extension evaluation specialists achieved consensus on 36 competencies (Table 2). The competencies fall within 10 domains including: (1) evaluation planning, (2) evaluation design, (4) situational analysis (5) data collection, (6) evaluation techniques and instrument development (7) data analysis (8) data utilization (9) communication and evaluation reporting (10) socio-political evaluation processes. The panel demonstrated the highest level of agreement on competencies focused on evaluation planning (e.g. conducting needs assessment, articulation of program theory and development of logic model), data utilization (e.g. using evaluation results for program development) as well as

Table 2. Core evaluation competencies agreed upon by evaluation specialists.

Items	Percentage
Conduct a needs assessment that informs program development	89.8
Use evaluation results to improve either an existing program or future programs	89.7
Clearly articulate a program theory of change	87.5
Ability to develop a logic model	85.0
Conduct culturally-responsive evaluations	85.0
Integrate evaluative thinking throughout programing cycle	84.2
Differentiate between inputs, outputs, outcomes and impacts	82.5
Follow best practices for ethical evaluations and human subject protection measures (i.e. IRB compliance procedures)	82.1
Measuring program outcomes and impacts	82.1
Understand the target audience for evaluation results	82.1
Understand how power, privilege, race and gender play in designing and analyzing evaluation data	81.6
Write impact statements	81.6
Determining how and when to collect data	80.0
Understand the type of evidence needed from an evaluation (based on who the evaluation results are for)	79.5
Develop a program theory of action	79.0
How to identify what data are important for the purpose of accountability	79.0
Ability to identify issues or problems (i.e. issue identification)	77.5
Understand what programs are worth evaluating	76.9
Utilize evaluation results to effectively develop and disseminate tailored messages to key stakeholder groups	76.9
Advocate for the value of evaluation and use of evaluation findings	75.0
Determine key stakeholders and engage them in program development and evaluation	75.0
Develop a list of evaluation questions that will guide the evaluation design	75.0
Develop measurable objectives aligned with intended program outcomes	75.0
Interpretation of evaluation results to understand program's ability to meet need or solve problem	74.4
Utilize multiple evaluation techniques that extend beyond surveys (i.e. focus groups, interviews, observation, records review, etc.)	74.4
Articulate the purpose, importance, and use of evaluation	72.5
Effective communication skills (written and oral) to engage stakeholders	72.5
Identification of impact indicators	71.8
Utilize appropriate scales of measurement	71.8
Specify the types of expected program outcomes	70.3
Develop an evaluation plan that is incorporated into the plan of work to link program development to evaluation	70.0
Develop appropriately framed questions/measures to effectively assess program outcomes (i.e. knowledge, behavior change, etc.) and needed improvements.	70.0
Differentiate the levels/types of outcomes	70.0
Understand data collection methods such as qualitative, quantitative, and mixed methods and select the method(s) appropriate for the program and audience.	69.2
Determine appropriate evaluation design and approaches for their programs	67.5
Develop a quality survey	67.5

culturally responsive evaluations and following best practices for ethical evaluations related to human subject protection measures. Evaluation specialists demonstrated strong agreement that an important competency was the integration of evaluative thinking throughout the programing cycle.

Early career extension professional Delphi study results

The panel of early career Extension professionals achieved consensus on 26 program evaluation challenges (Table 3). The challenges can be broadly organized into 5 categories including: (1) evaluation planning and design, (2) evaluation techniques, (3) evaluation logistics (4) data collection and analysis, and (5) evaluation reporting. All Delphi panellists indicated determining program impacts and how to measure those was an extremely or very important challenge for newer extension agents. Additionally, the panel agreed that the following four challenges were next most important to address, as indicated by

Table 3. Challenges faced by newer extension professionals that are important to address.

Item	Percentage
Determining program impacts and how to measure those	100.00
Development of accurate evaluation instrument for a given situation	89.66
Evaluating newly developed programs	89.66
Management and analysis of data collected	89.65
Evaluating long-term impacts of Extension programing	89.60
Developing goals and objectives	86.21
Understanding how to integrate evaluation into Extension programing	86.21
Challenges with the evaluation reporting system (i.e. reporting outcomes, structure, time frame of reporting)	86.21
Managing the limited time available for evaluation with the demand for evaluation work	86.21
Reporting on evaluation results	86.21
Understanding what outcomes can be reported in multiple areas	85.71
Difficulty in designing evaluation and collecting evaluation data from the participants of site visits, field days, exhibits, farm demonstrations, etc.	82.76
Evaluating behavior change	82.76
Lack of understanding of evaluation techniques and where it is best to use them	82.76
Maintaining engagement in evaluation among participants and staff that have done it many times before	82.76
Evaluating cost saving or return on investment	79.31
Getting Extension participants to respond for evaluation surveys	79.31
Getting in touch with participants for receiving feedback	79.31
Connecting evaluation to state-wide initiatives and priorities	79.31
Identifying impact indicators	75.87
Conducting pre-test, post-test evaluation	75.86
Development and implementation of follow-up evaluation	75.86
Evaluating participants that have already adopted the intended behavior/practice	75.86
Measuring how Extension program prevented unwanted outcomes (e.g. reduced childhood obesity)	74.97
Disseminating evaluation results to key stakeholders such as federal and state agencies as well as other organizations	72.42
Evaluating programs that have an extensive set of expected outcomes	72.42
Attaining acceptable participation to strengthen evaluation results	72.42

Note: Percentage indicates respondents who selected *extremely important* or *very important*.

the percentage who agreed they were extremely or very important: (a) development of accurate evaluation instrument for a given situation, (b) evaluating newly developed programs, (c) management and analysis of data collected, and (d) evaluating long-term impacts of Extension programing.

Comparison of results

Comparative analysis of the final results of the two Delphi studies, shows how early career extension professional program evaluation challenges are aligned with evaluation specialist identified core evaluation competencies. Table 4 outlines each core competency with the corresponding early-career evaluation challenge(s).

Conclusion, implications and recommendations

As extension continues to strive towards appreciable public value in many parts of the world, its human resource development and management approach will continue to promote competency development and remain steadfast in its inclusion of evaluation as a critical domain for extension professionals. This study utilized the Delphi technique to develop consensus among a national panel of extension evaluation specialists on a set of core evaluation competencies for extension professional development and competency assessment that is in tune with extension evaluation realities. The competency

Table 4. A list of the evaluation specialist identified core competencies with associated early-career challenges that correspond with each competency.

Competencies	Early-Career Challenges
1.0 Preparing for evaluation	
1.1 Articulate the purpose, importance, and use of evaluation	- Understanding how to integrate evaluation into Extension programming
1.2 Develop a program theory of action	- Understanding how to integrate evaluation into Extension programming - Evaluating programs that have an extensive set of expected outcomes
1.3 Differentiate the levels/types of outcomes	- Development of accurate evaluation instrument for a given situation - Evaluating programs that have an extensive set of expected outcomes
1.4 How to identify what data are important for the purpose of accountability	- Identifying impact indicators - Connecting evaluation to state-wide initiatives and priorities - Evaluating long-term impacts of Extension programming - Determining program impacts and how to measure those - Evaluating cost saving or return on investment
1.5 Ability to identify issues or problems (i.e. issue identification)	- Understanding how to integrate evaluation into Extension programming - Getting in touch with participants for receiving feedback - Developing goals and objectives - Connecting evaluation to state-wide initiatives and priorities
1.6 Understand how power and privilege and race and gender play into designing to evaluation data	- Maintaining engagement in evaluation among participants and staff that have done it many times before - Connecting evaluation to state-wide initiatives and priorities
1.7 Integrate evaluative thinking throughout programming cycle	- Understanding how to integrate evaluation into Extension programming - Managing the limited time available for evaluation with the demand for evaluation work
1.8 Conduct a needs assessment that informs program development	- Understanding how to integrate evaluation into Extension programming - Development of accurate evaluation instrument for a given situation - Developing goals and objectives
2.0 Planning evaluation	
2.1 Understand the target audience for evaluation results	- Reporting on evaluation results - Disseminating evaluation results to key stakeholders such as federal and state agencies as well as other organizations
2.2 Understand the type of evidence needed from an evaluation (based on who the evaluation results are for)	- Determining program impacts and how to measure those - Developing goals and objectives - Lack of understanding of evaluation techniques and where it is best to use them - Identifying impact indicators - Challenges with the evaluation reporting system
2.3 Understand what programs are worth evaluating	- Connecting evaluation to state-wide initiatives and priorities - Evaluating programs that have an extensive set of expected outcomes
2.4 Determine key stakeholders and engage them in program development and evaluation	- Maintaining engagement in evaluation among participants and staff that have done it many times before

(Continued)

Table 4. Continued.

Competencies	Early-Career Challenges
2.5 Develop a list of evaluation questions that will guide the evaluation design	<ul style="list-style-type: none"> - Getting Extension participants to respond for evaluation surveys - Getting in touch with participants for receiving feedback - Attaining acceptable participation to strengthen evaluation results.
2.6 Develop measurable objectives aligned with intended program outcomes	- Development of accurate evaluation instrument for a given situation
2.7 Identification of impact indicators	<ul style="list-style-type: none"> - Evaluating new programs - Evaluating programs that have an extensive set of expected outcomes - Lack of understanding of evaluation techniques and where it is best to use them
2.8 Utilize appropriate scales of measurement	- Developing goals and objectives
2.9 Specify the types of expected program outcomes	- Identifying impact indicators
2.91 Develop an evaluation plan that is incorporated into the plan of work to link program development to evaluation	- Development of accurate evaluation instrument for a given situation
2.92 Develop appropriately framed questions/measures to effectively assess program outcomes (i.e. knowledge, behavior change, etc.) and needed improvements.	<ul style="list-style-type: none"> - Determining program impacts and how to measure those
2.93 Understand data collection methods such as qualitative, quantitative, and mixed methods and select the method(s) appropriate for the program and audience.	<ul style="list-style-type: none"> - Understanding how to integrate evaluation into Extension programing - Connecting evaluation to state-wide initiatives and priorities
2.94 Determine appropriate evaluation design and approaches for their programs	<ul style="list-style-type: none"> - Evaluate behavior change - Evaluating participants that have already adopted the intended behavior/practice - Identifying impact indicators - Development of accurate evaluation instrument for a given situation
3.0 Conducting evaluation	- Development of accurate evaluation instrument for a given situation
3.1 Effective communication skills (written and oral) to engage stakeholders	<ul style="list-style-type: none"> - Conducting pre-test, post-test evaluation - Evaluating participants that have already adopted the intended /practice
3.2 Follow best practices for ethical evaluations and human subject protection measures (i.e. IRB compliance procedures)	<ul style="list-style-type: none"> - Difficulty in designing evaluations and collecting evaluation data from the participants of site visits, field days, exhibits farm demonstrations, etc. - Development of accurate evaluation instrument for a given situation - Evaluating newly developed programs - Connecting evaluation to state-wide initiatives and priorities - Measuring how Extension program prevented unwanted outcome (i.e. childhood obesity)
3.1 Effective communication skills (written and oral) to engage stakeholders	<ul style="list-style-type: none"> - Maintaining engagement in evaluation among participants and staff that have done it many times before - Getting Extension participants to respond for evaluation surveys - Getting in touch with participants for receiving feedback
3.2 Follow best practices for ethical evaluations and human subject protection measures (i.e. IRB compliance procedures)	<ul style="list-style-type: none"> - Development of accurate evaluation instrument for a given situation - Maintaining engagement in evaluation among participants and staff that have done it many times before

(Continued)

Table 4. Continued.

Competencies	Early-Career Challenges
	- Management and analysis of data collected
3.3 Conduct culturally-responsive evaluations	- Development of accurate evaluation instrument for a given situation - Attaining acceptable participation to strengthen evaluation results.
4.0 Collecting evaluation data	
4.1 Determining how and when to collect data	- Difficulty in designing evaluations and collecting evaluation data from the participants of site visits, field days, exhibits farm demonstrations, etc. - Lack of understanding of evaluation techniques and where it is best to use them - Development and implementation of follow-up evaluation
4.2 Utilize multiple evaluation techniques that extend beyond surveys (i.e. focus groups, interviews, observation, records review, etc.)	- Development of accurate evaluation instrument for a given situation - Difficulty in designing evaluations and collecting evaluation data from the participants of site visits, field days, exhibits farm demonstrations, etc. - Development and implementation of follow-up evaluation
4.3 Develop a quality survey	- Identifying impact indicators - Determining program impacts and how to measure those - Development of accurate evaluation instrument for a given situation
4.4 Measuring program outcomes and impacts	- Evaluating long-term impacts of Extension programming - Evaluating behavior/practice change - Evaluating cost saving or return on investment
5.0 Analysis and interpretation of evaluation data	
5.1 Interpretation of evaluation results to understand program's ability to meet need or solve problem	- Management and analysis of data collected
6.0 Communication, reporting, and use of evaluation findings	
6.1 Write impact statements	- Reporting on evaluation results
6.2 Utilize evaluation results to effectively develop and disseminate tailored messages to key stakeholder groups	- Reporting on evaluation results - Disseminating evaluation results to key stakeholders such as federal and state agencies as well as other organizations - Challenges with the evaluation reporting system
6.3 Advocate for the value of evaluation and use of evaluation findings	- Connecting evaluation to state-wide initiatives and priorities - Disseminating evaluation results to key stakeholders such as federal and state agencies as well as other organizations
6.4 Use evaluation results to improve either an existing program or future programs	- Understanding how to integrate evaluation into Extension programming - Evaluating newly developed programs

model, developed in this study, includes 36 evaluation competencies, which is 12 less than the model developed by Rodgers et al. (2012) and 25 less than the ECPE model (King et al. 2001). This represents the first attempt to develop a program evaluation competency

model that is not simply a utilization of already developed professional evaluator models and takes into consideration the various job responsibilities that extension educators manage in addition to evaluation. We believe it represents a practical, yet necessary knowledge and skill set for building the evaluation competence of early career extension professionals to be effective in extension education program evaluation. Using these competencies, extension professionals can successfully conduct meaningful evaluation to make programmatic improvements and demonstrate accountability to external organizations.

We developed consensus on 26 significant program evaluation challenges among early-career extension professionals to identify professional development efforts that could proactively mitigate the issues associated with challenging evaluation competencies. One challenge that stood out to the study team was ‘*Understanding how to integrate evaluation into Extension programming*’ that the panel demonstrated strong agreement on and can serve as a significant obstacle for the success of new extension professionals’ program evaluation efforts. Many extension professionals come to extension systems from diverse educational backgrounds with limited training in program development and evaluation, so beyond understanding their job responsibilities (Chazdon, Horntvedt, and Templin 2016; Lekies and Bennett 2011), it is a challenge for extension professionals to think about program evaluation at the program planning stage. This suggests as mentioned by Lamm, Israel, and Diehl (2013) that evaluation training needs of extension professionals should be identified early on in the professional’s tenure to ensure that he or she is able to conduct evaluation that extends beyond measuring participation and customer satisfaction.

Identification and assessment of competencies are ways of determining training and educational needs of extension professionals (Ghimire et al. 2017). Without adequate evaluation capacity, extension professionals will not be able to assess program outcomes and impacts. Assessment of extension outcomes and impact is essential for the justification of funding for extension. Considering many extension systems throughout the world are public funded organizations, this justification is very critical for the public funded extension systems. This highlights the implication of this evaluation competency model for building evaluation capacity among extension professionals across the globe for sustaining extension organizations.

This study represents the first to develop consensus among both evaluation specialists and extension educators with connections made to develop a competency model that promotes systematic evaluation capacity building in extension. When the 26 challenges faced by early-career extension professionals are grouped under the core competencies identified by the evaluation specialist expert panel, it provides a road map for designing needs-based on-boarding and initial in-service training programs. Addressing these challenges in a meaningful way will help to improve overall quality of extension evaluation and alleviate some of the issues of extension professional attrition because it will help early career professionals overcome difficult program evaluation challenges early in their career.

We recommend using the competency model developed based on the findings of this study for planning future on-boarding and initial training programs for evaluation capacity development of extension professionals. Our comparative analysis provides a clear guideline for evaluation specialist to plan educational programs that enable early

career extension professionals to face evaluation challenges realistically and build necessary evaluation competencies. As demonstrated in [Table 4](#), early-career extension professionals experience most of their evaluation challenges in the domains of evaluation preparation and planning. This outlines the need to focus on-boarding and initial training programs in these competency domains, with our model providing specific knowledge and skills that can position these professionals to be successful in their foundational evaluation work. The model also provides a pathway for additional in-service trainings based on the progression of evaluation responsibilities for early-career professionals to build competence in evaluation methods, data analysis, and reporting. If these early career extension professionals are not prepared to face these initial evaluation challenges realistically, they will continue to experience issues that may not compromise their ability to conduct evaluation but serve as a source of continued frustration. The prevalence of this situation could lead to extension professional attrition at their early career stage. Extension professional retention is a major challenge ([Safrit and Owen 2010](#); [Strong and Harder 2009](#)) that extension organizations dealing with in many parts of the world. The retention of extension professionals during the period of six months to two years after hiring for the job is very crucial, because this is the time, they tend to leave the organization mostly ([Martin 2011](#)). This situation highlights the significance and implications of our competency model in planning evaluation capacity building in-service training programs for early career extension professionals to help meeting their learning needs.

We conducted this study with the extension professionals in the US. This can be a limitation when the proposed competency development model is adopted in other locations. Therefore, we recommend considering the extension system's realities and make judgement accordingly when this competency model is applied for planning in-service training programs to build evaluation competency. We also like to emphasize that there are some similarities and differences across the states in the US extension system. Due to this variation in the US extension, findings of this study have possible implications for other extension systems. Additionally, many global extension systems and developmental organizations use tenets of US extension systems to design educational programs for their stakeholders, so our findings have applicability beyond US extension system.

While this study outlines the program evaluation challenges faced by early-career extension professionals, we believe that it is important to explore how they develop competencies to face these challenges over career tenure. For instance, a study conducted with extension professionals in Georgia, USA, revealed that their evaluation training needed competency areas vary based on years of experience of the professional. The professionals with five or less years of experience needed professional development in the areas such as data collection and designing surveys while the professionals with more than five years of experience were challenged with data analysis and reporting ([McClure, Fuhrman, and Morgan 2012](#)). We believe it is important to identify a process that promotes an open line of communication between extension evaluation specialists and educators to receive feedback and develop solutions that can address challenges along the career timeline. Evidence shows that tailoring competency development to career stages is an effective approach to needs based training and doesn't overwhelm its participants with information not pertinent to their career stage ([Rennekamp and Nall 1994](#)).

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Disclosure statement

The first author of this publication serves as the current Chair for the American Evaluation Association Extension Education Evaluation Topical Interest Group. This role does not hold supervisory responsibilities simply facilitating national collaboration in program evaluation. The results of this study will be used to provide strategic direction to that group.

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