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## Factors Influencing Adoption and Implementation of Cooking With Kids, An Experiential School-Based Nutrition Education Curriculum

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# **Factors Influencing Adoption and Implementation of Cooking With Kids, An Experiential School-Based Nutrition Education Curriculum**

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**Abstract:** Little research has been conducted to examine factors leading to adoption and implementation of nutrition education curricula. Data from two Web-based surveys (n = 313) and 27 interviews were used to explore how Diffusion of Innovations' perceived attributes contributed to adoption and implementation of Cooking with Kids (CWK) food and nutrition education curriculum. Results suggest programs that create or adapt nutrition education curricula for use in schools should emphasize experiential methods and ease of use to increase adoption and implementation. Perceived simplicity predicted intended use. Ensuring that users have adequate information and planning time to overcome barriers is essential.

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## **Introduction**

Investigators reviewing literature to determine use of health promotion/disease prevention research in practice settings (Cunningham-Sabo et al., 2007; Estabrooks, Dzewaltowski, Glasgow, & Klesges, 2003)

found insufficient research on adoption and implementation of nutrition interventions in schools. Extension educators offer perspectives of strengths and challenges encountered with various audiences and settings, which play an important role in translating research into practice (Serrano, Anderson, & Chapman-Novakofski, 2007).

Diffusion of Innovations (DOI) theory indicates that perceived attributes of an innovation (new practice) strongly affect adoption and diffusion of that practice (Rogers, 2003). A brief description of each perceived attribute follows.

- **Relative advantage** - degree to which an innovation is perceived as better than the practice it supersedes
- **Compatibility** - degree to which an innovation is perceived as being consistent with existing values, past experiences, and needs of potential adopters
- **Complexity** - degree to which an innovation is perceived as difficult to understand and use
- **Trialability** - degree to which an innovation may be experimented with on a limited basis
- **Observability** - degree to which results of an innovation are visible to others

Little research has been conducted examining DOI perceived attributes as they relate to nutrition education curricula adoption and implementation (McCullum-Gomez, Barroso, Hoelscher, Ward, & Kelder, 2006; Nanney et al., 2007), yet these attributes have potential to broaden understanding of why some nutrition education curricula are adopted and implemented while others are not. The Cooking with Kids (CWK) curriculum includes cooking lessons and tasting lessons that encourage elementary schoolchildren's innate curiosity and enthusiasm for food through direct experience with fresh, affordable foods (Walters & Stacey, 2009). Cooking lessons emphasize foods from around the world. Tasting lessons engage students in sensory exploration of fruits and vegetables with minimal food preparation and no cooking. All lessons are aligned with state academic standards and provide applied learning opportunities in language arts, social studies, math, science, and health education. The purpose of the study reported here was to explore how DOI perceived attributes contribute to adoption, implementation, and adaptation of CWK.

## Methods

### Study Design

The study used a mixed methods design to collect and analyze quantitative and qualitative data via Web-based surveys and telephone interviews. The study design, procedures, and instruments were approved by University of New Mexico and Colorado State University Institutional Review Boards.

### Participants and Recruitment

Participants for two Web-based surveys, the Nutrition Education Curriculum Survey (NECS) and Fruit and Vegetable Tasting Survey (FVTS), were recruited from individuals throughout the U.S. who registered on

the CWK website to download free fruit and vegetable tasting lessons. Interview participants were recruited from NECS and FVTS survey respondents as well as CWK curriculum purchasers. Purposive samples from each group (NECS, FVTS, and purchasers) were selected for interviews. Care was taken to approximate the distribution of Cooperative Extension System Regions, work environment, and curriculum purchase year from the original sample.

## Instruments and Procedures

The Web-based surveys consisted of five-point Likert scale questions plus several open-ended questions. The 92-item NECS consisted of five-point Likert scales measuring DOI (Rogers, 2003) perceived attributes related to nutrition education curricula, as well as demographic information and questions about downloading and using CWK tasting lessons. The 29-item FVTS included demographic information and questions about downloading and using CWK tasting lessons. The major difference between the NECS and FVTS was that the NECS contained 35 questions evenly divided into five scales measuring Rogers' DOI perceived attributes. Complexity items were worded to indicate lack of complexity, or simplicity; therefore simplicity is used in this article to describe this concept.

DOI survey items were developed from an open-ended questionnaire administered to a convenient sample of 13 individuals known to have interest in nutrition education curricula. Half of the respondents self-identified as dietitians or non-profit staff. The remaining respondents included Family and Consumer Science Extension agents, public health advocates, university professors, and parents. Responses revealed consistent descriptive language for each perceived attribute. Surveys were tested for face validity and administered via an online survey program (SurveyMonkey, 2007).

Qualitative interviews were semi-structured, using open-ended questions to explore reasons for choosing the curriculum, essential curriculum components, adaptations, and barriers to implementation. Interviews were recorded, transcribed, and uploaded into NVivo 8® ("NVivo qualitative data analysis software," 2008) for qualitative data analysis.

## Data Analysis

Descriptive analysis included frequency measures. We examined differences between NECS and FVTS respondents on the importance of curriculum characteristics via chi-square analysis. Cronbach's alpha determined internal consistency of questions based on the original DOI perceived attribute grouping of survey items. Construct validity of survey items relating to perceived attributes was assessed using principal factor analysis with varimax rotation. In addition, communalities (proportion of item variance explained by the combined factors) were examined to assess generalizability of factor extractions (Hogarty, Hines, Kromrey, Ferron, & Mumford, 2005). Final solution quality was evaluated with Kaiser-Meyer-Olken (KMO) measure of sampling adequacy, acceptable if  $>0.5$  (Hair, Anderson Jr., Tatham, & Black, 1998; Kaiser & Rice, 1974), Bartlett's test of sphericity, the amount of variance explained, overdetermination of factors (number of items per factor, item loadings  $>0.4$ , and internal consistency of factors), and theoretical meaningfulness of the resulting factors. Internal consistency of questions using Cronbach's alpha was repeated based on factor analysis results. Finally, we explored predictors of intended future use of tasting lessons via Pearson correlations and stepwise multiple regression. Significance was set at  $p \leq 0.05$ .

The 27 interview transcripts were coded inductively (Thomas, 2006) and deductively (Miles & Huberman, 1994) using directed content analysis (Hsieh & Shannon, 2005). Coders came to consensus on interview question level coding during an initial pass through each document with a second pass for further coding refinement to address research questions and theory as appropriate. Two coders independently coded nine transcripts to assess reliability.

## Results and Discussion

### Surveys

#### *Descriptive Analysis*

NECS (n=109) and FVTS (n=204) respondents were primarily female, representing 95% and 90% of survey samples, respectively. Surveys had fairly equal geographic distribution throughout the U.S., although there was slightly more representation from the Western region. School and community/Extension education positions were the most prominent employment descriptors on both surveys, representing 42% of NECS respondents and 67% of FVTS respondents. Approximately 17% of NECS and 29% of FVTS respondents worked in community/Extension education positions. Survey respondents learned about CWK primarily through Internet searches (72% and 77% of NECS and FVTS respondents, respectively).

When asked to rate the importance of characteristics that led to downloading CWK tasting lessons, respondents of both surveys indicated that important attributes were that lessons were free, easy to implement, and tailored for different age groups (Table 1). Interestingly, lessons in Spanish were not overly important for these groups, which supports findings by others (Hoover, Cooper, Tamplin, Osmond, & Edgell, 1996) but contradicts recommendations for culturally responsive curricula (Espinosa, 2005). Our findings reflect the fact that 87% of NECS respondents and 90% of FVTS respondents who used tasting lessons taught the lessons in English; the remaining 13% and 10%, respectively, taught lessons in both languages.

**Table 1.**  
Importance of Characteristics That Led to Downloading CWK Tasting Lessons

Characteristic	Important or Very Important (%)	
	NECS	FVTS
Importance of lessons that appear easy to implement	92	90
Importance of program having a good reputation	47 <sup>a</sup>	58 <sup>a</sup>
Importance of lessons tailored for different ages of students	94	87
Importance of free cost	89	89
Importance of lessons in Spanish	32	26
Importance of looking for nutrition education materials	99 <sup>b</sup>	87 <sup>b</sup>
<sup>a</sup> p=0.001 <sup>b</sup> p=0.013		

Pearson's chi-square investigated whether NECS and FVTS respondents differed on their perspective on the importance of curriculum characteristics. Results indicate that NECS and FVTS respondents perceive the importance of the program's reputation and looking for nutrition education materials differently. FVTS respondents were more likely to view the program's reputation as important or very important ( $\chi^2=10.97$ ,  $df=1$ ,  $N=225$ ,  $p=0.001$ ). Phi, which indicates the strength of the association between two variables, is 0.22,

which is a small to medium effect size (Cohen, 1988). On the other hand, NECS respondents were more likely to consider looking for nutrition education materials as an important or very important reason that led to downloading CWK tasting lessons ( $\chi^2=6.23, df=1, N=251, p=0.013$ ). Phi of -0.16 indicates a small to medium effect size (Cohen, 1988).

### Factor Analysis

The NECS included 35 questions related to DOI perceived attributes. Initial reliability of the five perceived attribute scales was unacceptable for compatibility ( $\alpha=0.55$ ), relative advantage ( $\alpha=0.41$ ), trialability ( $\alpha=0.58$ ), and observability ( $\alpha=0.34$ ). However, initial reliability for simplicity ( $\alpha=0.64$ ) was acceptable. In behavioral research,  $\alpha > 0.6$  is acceptable (Kerlinger & Lee, 2000). Given the relatively low participant-to-item ratio (approximately 3:1), Bartlett's Test of Sphericity and the KMO measure of sampling adequacy were reviewed. Bartlett's Test of Sphericity was significant (approximate  $\chi^2=1192.25, df=595, p<0.001$ ) and the KMO measure of sampling adequacy was acceptable at 0.65, providing evidence for an adequate number of significant correlations among items to justify proceeding with factor analysis.

Initial factor analysis revealed 20 items with loadings greater than |0.40| that converged in seven iterations yielding a five factor solution. However, one factor only had two questions that loaded, so that factor was dropped from the final solution. The final four factors related to perceived attributes of compatibility, relative advantage, simplicity, and trialability (Table 2). The final four factor solution converged in seven iterations with eigenvalues  $> 1.0$  (range 1.97-5.99) that explained 35.8% of the variance. These results indicate that a shorter 20-item survey could be used to measure attitudes relevant to nutrition education curriculum adoption and implementation.

**Table 2.**  
Factor Loadings and Responses to 20 DOI Perceived Attribute Survey Items

Perceived Attribute	Statement	Factor Loading	Strongly Agree or Agree (%)	Strongly Disagree or Disagree (%)
Compatibility	Before I adopt a new curriculum, it must be clear that the lessons are culturally appropriate.	0.505	89	4
	Nutrition education curriculum for children must be aligned with Academic Standards for me to use it.	0.541	53	27
	Nutrition education curricula do not need to be aimed at achieving specific behavior changes.	-0.496	28	51
	Nutrition education materials that are available	0.450	64	14

	in different languages are more useful than materials only available in English.			
	Seeing nutrition education lessons implemented in a school is the only way that I can know that they work. (original observability item)	0.463	9	69
Relative Advantage	Hands-on activities work better in teaching nutrition education than didactic methods.	0.724	97	0
	Cooking activities that incorporate other kinds of learning into nutrition education are important to me.	0.429	93	1
	Hands-on activities work better in teaching nutrition education than lecturing.	0.773	96	0
	Sample units make nutrition education curricula easy to try out.	0.515	91	0
Simplicity	When considering new nutrition education materials, one important factor is seeing that they are designed for the intended audience.	0.444	99	0
	Nutrition education curriculum does not need to be easy to use.	-0.415	2	90
	It is important that nutrition education curricula specify all of the materials needed for each lesson.	0.676	99	0
	Lesson plans need to be easy to follow.	0.665	100	0
	Materials need to be readily available to implement nutrition education lessons. (loaded also in trialability)	0.407	96	0
Trialability		0.499	96	0

Materials need to be readily available to implement nutrition education lessons.			
An attractive format makes me want to try out a new curriculum.	0.545	83	6
I like nutrition education lessons that are downloadable from the internet.	0.382	92	2
It is helpful to be able to pilot new lessons before purchasing a whole curriculum.	0.519	98	1
Clear directions make new nutrition education curricula easy to try out.	0.619	99	0
It is important for me to be able to see a nutrition education lesson in action. (original observability item)	0.473	55	21
Demonstrations of components of nutrition education curricula can show how a curriculum works. (original observability item)	0.430	79	1

Some survey items developed for the observability scale loaded under trialability and compatibility (Table 2). Others have found that trialability and observability fuse into one factor (Hurt & Hibbard, 1989). The authors attributed this result to potential ambiguity in item construction and conceptual attribute overlap. One survey item was retained in more than one factor due to cross-loading (Table 2). Reliability testing based on factor analysis results indicates acceptable reliability for compatibility ( $\alpha = 0.61$ ), relative advantage ( $\alpha = 0.71$ ), simplicity ( $\alpha = 0.69$ ), and trialability ( $\alpha = 0.71$ ).

The majority of NECS respondents agreed or strongly agreed with statements reflecting perceived attributes of relative advantage, simplicity, and trialability (Table 2). These results support findings indicating the importance of experiential learning, academic integration, and user-friendliness (Belansky et al., 2006), as well as cultural relevance (Perez-Rodrigo & Aranceta, 2003) of nutrition education curricula. However, some survey statements related to compatibility revealed varying opinions on the necessity of aligning nutrition education curricula with academic standards. Although 53% of respondents reported alignment with academic standards as a critical component of curricula compatibility, only 41% of respondents used tasting lessons to meet academic standards.



## ***Prediction of Intended Future Use***

Summated scales of the four perceived attributes that emerged from the factor analysis were calculated. Summated scales for relative advantage, simplicity, and trialability were significantly correlated with planned future use of tasting lessons ( $r=0.21, p=0.043$ ;  $r=0.22, p=0.034$ ; and  $r=0.22, p=0.042$ , respectively). Respondents who had relatively high summated scores for relative advantage, simplicity, or trialability indicated intention to use tasting lessons in the future. These correlations are considered to be small to medium (Cohen, 1988). Stepwise multiple regression was conducted to investigate the best predictors of planned future use of tasting lessons and revealed that simplicity predicted future planned usage of tasting lessons ( $p=0.034$ ).

## **Interviews**

The interview sample ( $n=27$ ) was 96% female; 85% of interviewees held bachelor's (37%) or master's (48%) degrees. Interviewees were primarily employed by Extension (30%) or schools (41%) and learned about CWK mainly through Internet searches (59%). Coding reliability using percentage agreement methods ranged from 87% - 100% for nine reliability documents, indicating good agreement (Simons-Morton et al., 1992).

Analysis of interview transcripts resulted in identification of multiple desirable attributes of nutrition education curricula, including cultural relevance, experiential learning, user-friendliness, grade level adaptations, and ability to adapt curricula to multiple situations and settings. Limited resources were the predominant barrier to implementing the curriculum.

## ***Desirable Attributes of CWK***

Descriptive analysis results (Tables 1 and 2) were supported by themes from interviews. In addition to the overall user-friendliness of the curriculum, interviewees highlighted the diversity of cultures and foods in the cooking curriculum and integration with core academic subjects as reasons for choosing the curriculum, similar to other research findings (Belansky et al., 2006).

"I liked how diverse the curriculum is. I also liked how user-friendly it appeared, and it certainly turned out to be very user-friendly. It explores a lot of different foods from around the world, a lot of different subjects, and that really appealed to me; it also did to the kids."

~curriculum purchaser #3

"This exposed kids to a lot of different cultures that they would never, ever have experience with, especially the low-income children. This gave them the chance to try new foods and be able to get a hands-on and fix the foods themselves. So it was absolutely just right up our alley what we were looking for."

~curriculum purchaser #5

"What I was interested in was finding something that allowed me to do cross-curricular activities and learning but based in the kitchen."

~curriculum purchaser #9

As noted in Tables 1 and 2, hands-on, experiential activities are considered important. This emphasis was also seen in interview responses indicating that the hands-on experiential component of CWK was considered essential. These results reflect research from other groups about the importance of hands-on experiences (Hammerschmidt, Murphy, Youatt, Sawyer, & Andrews, 1994; Hoover, Martin, & Litchfield, 2009).

"Well I think hands-on is always good, no matter what. It's my own personal experience with adults as well as children, you can tell anybody anything, you can make anybody read anything, but it's not until it's this hand-eye connection, touch, feel, that people really get it."

~curriculum survey respondent #4

"You need to make sure that whoever is behind those lessons lets the kids do the work. You don't want to save time at the expense of kids not getting the experience or the skill base."

~curriculum purchaser #11

Some interviewees incorporated a school garden as an adaptation and used garden produce in tasting activities. Other adaptations included ingredient substitutions due to availability or cost, addition or deletion of activities due to available time and/or equipment, or stretching a lesson over several days due to time constraints.

"I would pair a tasting activity every day with a regional activity, because I had four hours to fill [during a summer school program]. One day I brought in [the book] *Green Eggs and Ham*, and we read [it], I think that was the first day, because that was an easy cooking activity and they were getting used to the kitchen. So I brought in some supplemental activities as well."

curriculum purchaser #9

"Not a lot of our educators have a two-hour span at one time. So, some are actually doing one cooking lesson over a week's time. So what they may do is day one, they may do the reading part. And day two they may do the math or the geography part. And day three they may discuss the recipe, and by day four they're actually cooking. We sometimes only have a thirty minute span, you know, with the kids, so they broke it down into where one lesson, or one cooking activity, will take them a week."

~curriculum purchaser #5

## ***Barriers to Implementation***

Barriers to implementing CWK were primarily related to limited resources. Some participants indicated that it's difficult to get permission to go into a school classroom for 2-hour blocks of time to teach cooking lessons due to testing requirements that are prevalent in schools. Other barriers included limited resources related to funding, space, and volunteers. The barriers reported in this study support findings from other

research (Lanigan & Power, 2008).

"Funding is probably number one, because one of the most important things I'm finding is that to do cooking in the class[room], there are some teachers, there's a portion that want to, but they end up buying a lot of their own supplies, especially food."

~curriculum survey respondent #1

"Some of the facilities did not have the space for a nutrition cart. They did not have a covered space even to put everything that's required for the recipes."

~curriculum purchaser #2

"I think for it to be a success you would have to do it as it is written with parent volunteers, because I think for it to be successful you have to have a high adult-student ratio."

~curriculum purchaser #9

Another barrier mentioned during interviews was teacher comfort with cooking. The CWK curriculum includes 2-hour cooking lessons and 1-hour fruit or vegetable tasting lessons. Several interviewees (who were teachers) indicated that they are more comfortable conducting tasting lessons in the classroom than cooking lessons because tasting lessons involve minimal food preparation and no cooking.

## ***Limitations***

Four limitations are noted.

1. The survey contained negatively worded DOI perceived attribute statements. Although negatively worded items and a balance of negatively and directly worded items have been recommended to reduce response bias (Cronbach, 1950; Nunnally, 1978; Anastasi, 1982), recent research recommends discontinuing this practice (Babbie, 1998; Baxter & Babbie, 2004).
2. Although internal consistency was measured for appropriate survey items, test-retest measures were not performed.
3. A small number of individuals were interviewed (n=27); however, care was taken to recruit a representative sample. In addition, saturation of themes was reached.
4. A limited number of responses were available for use in factor analysis (n=109). However, the acceptable KMO measure, item communalities, limited number of extracted factors, and probable overidentification of the trialability factor argue for stability of the factor solution (Hogarty et al., 2005; MacCallum, Widaman, Zhang, & Hong, 1999).

## Conclusion

Results of the study reported here indicate that a 20-item survey could be used to measure attitudes relevant to nutrition education curriculum adoption and implementation by Extension professionals and K-12 teachers. With further research, the survey has potential use for predicting adoption and implementation of nutrition education curricula. In particular, perceived relative advantage, simplicity, and trialability were correlated with planned future curriculum use, indicating that Extension practitioners should aim to include easy-to-use curricula that offer a perceived advantage over previous curricula and can initially be used on a trial or pilot basis. In addition, simplicity significantly predicted future planned curriculum use. Programs that create or adapt nutrition education curricula for use in schools should focus on making curricula easy to use and understand in order to increase adoption and implementation.

The study also highlights several curriculum attributes desirable for nutrition education. Programs that create or adapt nutrition education curricula for use in schools should incorporate experiential "hands on" components such as food preparation or other participatory activities that engage students' senses and incorporate learning opportunities in a variety of school subjects. In addition, because user-friendly products are desirable, Extension practitioners who create nutrition education curricula should incorporate handouts, worksheets, and activities that are in a user-friendly format such as in a three-ring binder for ease of copying. Programs should anticipate barriers to implementing nutrition education curricula, including lack of adequate resources. In order to overcome barriers to implementation and to support sustainability of use, it is essential that curriculum users have adequate information and planning time.

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