Exploring the Challenges of Food Science and Nutrition Education in Secondary Schools through Teacher Reflective Discourse on an E-mail Discussion Listserv

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This article examines the challenges faced by secondary teachers who teach Food and Nutrition (F & N), and how a professional listserv can be used to address those challenges. The purpose of this qualitative research study was to explore the challenges and solutions through the teachers' asynchronous online text conversations on a professional e-mail listserv. A total of 2,586 e-mails from a statewide e-mail listserv, with 978 emails identified as F & N-related content, were collected. The findings show that challenges lie in food lab management, budgeting, and planning. In addition, food allergies, a lack of administration support in course scheduling, limited Spanish materials, restricted or indistinct school policies for the use of teaching aids created barriers to effective classroom practice. In conclusion, the study found the listserv to be a valuable tool for secondary teachers to support one another's needs when teaching F & N.

For the last three decades, the rate of childhood obesity in the United States has increased (Center for Disease Control and Prevention; [CDC], 2013a). The main causes of the epidemic are the consumption of excess calories and inadequate physical activity (CDC, 2013b). To address this growing problem, the CDC suggest focusing on the food and physical activity environment in the home, childcare centers, and schools. Because of the school's role in the daily lives of children, it becomes important for schools to become the "educational institutions that are committed to creating curricula, a social and physical environment, and social relationships which promote healthy life trajectories for students, families, staff, and communities" (Rugils & Freudenberg, 2010, p. 1565).

As with any school change, teachers will be expected to play a critical role in improving nutrition education in schools. *Healthy People 2010* states, "Nutrition course work should be part of the core curriculum for the professional preparation of teachers of all grades and should be emphasized in continuing education activities for teachers" (U.S. Department of Health and Human Services [HHS], 2000, p. 19-6). Unfortunately, there has not been much emphasis placed on the development of teacher education and training in nutrition topics (Cho & Nadow, 2004; Kirkpatrick, Briggs, & Zidenberg-Cherr, 2007; Murimi, Sample, Guthrie, & Landry, 2007; Pivarnik et al., 2009). This lack of attention can further weaken the state of food and nutrition (F & N) instruction in schools even as national academic standards emphasize the need to integrate food and nutrition into K-12 curriculum planning and development.

In addition to insufficient training, nutrition education researchers point out that (a) time limitations, (b) frustration about coordination and collaboration with other school staff, (c) insufficient funding, and (d) the absence of administrative recognition discourage secondary teachers from becoming competent teachers of food and nutrition (Cho & Nadow, 2004; Hazzard,

Moreno, Beall, & Zidenberg-Cherr, 2011; Kirkpatrick et al., 2007; Kubit, Lytle, Hannan, Story, & Perry, 2002; Murimi, et al., 2007; Smolak, Harris, & Levine, 2001). These factors have a significant adverse impact on teaching and outcomes. Teachers cannot easily remove these barriers without full support from schools, parents, community-based organizations, the government, and the media (Cho & Nadow, 2004).

The Internet has dramatically changed the way teachers share and engage in critical discourse. Reflection is increasingly practiced via electronic files and text instead of with paper and pen. Pennington, Wilkinson, and Vance (2004) found K-12 physical educators were willing to support each other in sharing teaching activities, resources, and instructional strategies while participating in a listserv. There is evidence to suggest teachers and professionals who have similar concerns and interests will support one another's needs by sharing best practices online, distributing knowledge electronically, and helping instructors share products through an online community (Bonk, Wisher, & Nigrelli, 2004; Hyman, 2003; Reynolds, 2002). The online community also serves as a source for professional learning by re-examining the strengths and the weakness of ideas and practices through peer review (Duncan-Howell, 2010; Guldberg, 2008). One such online community is a professional email listserv. An e-mail listserv can play a role in online communication, reflection, and support to help teachers mitigate some barriers to teaching food and nutrition.

The purpose of this study was (a) to explore the contemporary barriers and uneasy experiences of teaching food and nutrition as secondary schoolteachers reflected on the listserv discussion; and (b) to discover the ways in which teachers solved the problems or generated solutions with the support from the listserv.

Methodology

Quantitative surveys used by the aforementioned studies do not lend themselves to giving teachers a voice. The teacher's voice is important to reveal the causes and check the realities of perceived barriers when teaching nutrition. A qualitative data set was needed to provide insight to understand the challenges when teaching F&N.

Participants

An e-mail discussion listserv for Family and Consumer Sciences (FACS) teachers, hosted by the state department of education in a Midwest state, was selected to study. The listserv was not written for any course or training, and all conversations had concluded before the study was conducted. The researchers of this study did not participate in any of these conversations. The conversations happened spontaneously, and the administrator and subscribers did not expect to be participating in a research study while the conversations occurred.

The listserv archive was open to the public and the listserv administrator was notified with an informed consent statement via e-mail before the data collection. Data are reported in aggregate terms and all names of the subscribers and their school/workplace remain anonymous. A total of 2,586 e-mails were collected from the listserv archive from June 2006 to May 2008. Thirty-eight percent of these e-mails (n = 978) were identified as food and nutrition-related content.

Analysis

Transcript analysis was used to examine the teachers' reflective discourse about Food & Nutrition. ATLAS.ti 6.2 ([A6], Scientific Software Development, Berlin, 2010) was the

software used to facilitate the analysis. The primary researcher sorted all eligible e-mails into 25 topical categories and calculated the frequency each topic was discussed to identify the most salient F&N issues facing teachers (Table 1). Peer debriefing was used to ensure the trustworthiness of data analysis, and it, too, relied on e-mail communication. The identities of subscribers were removed and anonymity was used in data analysis and reporting.

Findings

Table 1 shows the most discussed topics in this listserv. These topics were merged into five broader-defined themes in order to present the findings comprehensively.

Table 1.

Topics of Reflective Discourse

	n[a]	*%*
Food labs	148	15.1
Teacher resources	114	11.7
Curriculum design & guidance	98	9.8
Recipes	90	9.2
Movies/Shows/Videos	53	5.4
Financial affairs	49	5.0
Food safety & Sanitation	39	4.0
Culinary skills	37	3.8
Policies, regulations and laws	35	3.6
Fruits & Vegetables	31	3.2
Professional events	31	3.2
Jobs & Careers	30	3.1
MyPyramid	30	3.1
Particular foods	29	3.0
Food & Events	25	2.6
Interdisciplinary teaching	24	2.5
Evaluation & Assessments	23	2.4
Food allergies	21	2.1
Environmental & Social issues	15	1.5
Miscellaneous	14	1.4
Dietary concerns	11	1.1
Educational technology	11	1.1
Dietary fat	10	1.0
Dietary guidelines	9	0.9
Dietary Substitutes	3	0.3

[a] Total sample of 978 e-mails

Issues Teaching Food Labs

The listserv e-mails discussing laboratory management, instruction, and activities were coded as food labs. The FACS teachers were often responsible for managing the labs. They found themselves adding, fixing, and replacing certain lab supplies, appliances, and equipment. Budgetary constraints were common in every school. Getting permission and funding for new

merchandise can be an expensive proposition for improving the FACS department. Two teachers recommended making a bigger investment in quality materials and equipment at first if it fits the budget because they found "over the years they have proved a good deal".

Lack of money also challenged teachers' creativity when conducting food labs. One of the money-saving ideas was having students bring foods from home. For many families, however, there was never enough food at home, let alone enough extra food for their children to bring to school. A teacher stated, ". . . their budget is extremely low for the department of 4 teachers . . . the students really cannot afford to bring food in from home . . . Are there any companies out there that are willing to help out with donations?" In addition to purchasing inexpensive ingredients and using coupons and sales to lower the cost, one teacher obtained great help from the school food service manager who was able to share the excess and allowed the teacher to "order from her surplus commodity list and paid the shipping." This kind of support could lead to further cooperation and collaboration throughout the school community.

Another challenge teachers faced with food labs was the increased number of students accepting free and reduced lunches (FRL), and schools having difficulties collecting lab/class/book fees from the non-FRL students. One teacher shared, "Our school . . . has about 50-60% . . . My principal told me we only collected about 20% from our parents last year. We put them on payment plans etc., but many still do not pay!" Another teacher pointed out the FRL students are qualified for the entire year regardless of their family's employment status in the next week, so she felt the difficulties they met were caused by a flaw in the law.

To raise funds, teachers looked to grants and fundraisers. Although there were a few opportunities for federal grants announced through this listserv, such as Team Nutrition mini-grants and The U.S. Department of Agriculture Fresh Fruit and Vegetable Program, the opportunities were limited. On the other hand, fundraising not only helped teachers earn enough profits for their class but was a creative and practical way for students to apply learned skills in real life. A teacher stated, "I try to teach the students that when we possess a skill it is important to use that skill for others as well as for ourselves. For this reason . . . we also use the skill to earn money for the department."

Increased enrollment also turned out to be another challenge. Having a larger class size means there are more students to supervise. The following statement is from a teacher who thought the administration seemed to have no understanding of this problem, "My administrator . . . has never been in my classroom . . . I am having trouble with the attitude of "just deal with it" with little to no consideration to students' safety and the liability issues if someone gets hurt."

Moreover, one teacher questioned whether the school could provide enough equipment for the extra students. Yet, it was necessary for the teachers to communicate with administrators. If the administrators still do not get it, a teacher suggested, "INVITE them to your class – let them SEE what you are talking about – BRIBE them with FOOD if you have to."

A 45-50 minute lab time limits quality teaching. Teachers must adapt homemade recipes themselves or make requests for alternatives on the listserv. A teacher expressed her difficulties with a yeast fermentation lab and making yeast bread, "I picture myself punching down and baking 30 loafs of bread some evening by myself and then what would the students be learning?" Another teacher encouraged her to try a new cool-rise method which allows her to "make the yeast dough one day, put it in the refrigerator overnight, and bake the next day."

Even with this method, teachers who taught multiple classes in one semester had to split the lab into two days. One teacher thought it was not a disadvantage, "because our students get to learn the time management skill of making foods ahead and freezing them."

Food allergies are a life-threatening and ongoing health issue among children in the United States (HHS, 2012). It challenges teachers when they must revise their curriculum. A teacher described her struggles,

> I have a student 4th period who is allergic to peanut butter . . . She was upset that I sent her to the library to do the same assignment that the rest of the class will be doing when finished with their 15 minutes of cooking. She asked why I keep having labs using peanut butter . . . (mainly because of the price and most students like it) . . . Should I ban peanut butter from my other 114 students so that she doesn't get sick?

Another teacher suggested, "Take this opportunity to teach your students about the explanation for allergies and how they will have to make these same changes when they become parents because they won't be able to offer all the same foods to their children . . ."

Two teachers mentioned their schools acknowledged the consequences of students' food allergies by creating a nut-and-peanut-free environment. They not only stopped using nuts and peanuts in classes but have "removed nut products from food lines, vending machines, and fundraisers sold inside the school (bake sales)."

Issues of Curriculum Design and Guidance

The main issues included teaching with abstract concepts of foods and nutrients, unhealthy snacks, and difficulties covering chapters in textbooks. Teaching students the mechanism of how nutrients and metabolism benefit the human body can be difficult because students do not have a sufficient biochemistry background to support this conceptual learning. Teachers often encouraged students to memorize the functions and food sources of each nutrient, continuously reinforcing the information they obtained. A teacher reflected on her own teaching, "Unfortunately this topic doesn't seem relevant to them until some doctor later in their life tells them to improve their nutrition. (Notice how many adults complain to us that they wish they knew nutrition?)." As the teacher mentioned in the quote, when designing health-related curriculum on this subject, a real-life situation may help learners associate the knowledge with their personal interests and support their life-long learning. Four teachers suggested using the written lesson/activity, *Nutrient Bodies*, presented in a conference and published in the conference notebook. The lesson engaged students with drawings by tracing their own bodies. Teachers required students to label and match the functions and food sources of each nutrient with the relevant body parts. One teacher admitted, "Don't expect them [students] to grasp all the nutrients at once. Too much information, even though we don't think it sounds like that much, they do [not] see it as easily as we do."

The information provided through conferences had successfully met teachers' satisfaction in their professional development. A teacher felt that she was left out from such opportunities because her school did not permit her to attend: "Since [our] school has not allowed the teachers to go to conferences for the past several years, how can we get the information . . . ?"

Another difficulty raised was teachers not having enough time to cover all chapters about nutrients. A teacher said, ". . . I do not feel that I have time to dwell on each nutrient for a specific period of time. Also, I find it difficult to discuss one without the other . . ." A shared strategy in the listserv showed it was more practical to facilitate students making connections

among nutrients and each food group via the food pyramid rather than to follow the textbook. It may save teachers time because the pyramid groups foods by their major nutrient content and all the nutrients included in these chapters can be systematically covered.

A teacher requested an activity to engage students about the basic relationship between nutrition and fitness by calculating the calories in Hershey Kisses versus calories burned during exercise. Many teachers had concerns that using candies in formal classroom teaching might go against school wellness policies because candies would be considered an unhealthy snack. One teacher described the implementation in her school, "Our cafeteria still sells anything they want, and the athletic concessions and fundraisers would be devastated if they couldn't sell candy. We have a policy but it has basically been implemented as 'suggestions'." Teachers often held positive opinions when teaching with candies and considered them an effective way to first introduce the relationship between calories and fitness. Candies are highly accepted among teenagers, and they need to understand "how much work it takes to burn off candy no matter where they eat it. . ." in order to adjust their own behaviors.

Issues of Teacher Resources

Online resources were the most shared format. Teachers spontaneously shared the resources they found. The listserv administrator compiled the shared information and resources on the corresponding website. She notified the teachers with the following announcement,

> As more of you share files and URLs that lead to teaching resources, we'll post them on the [state] FACS websites. This will keep the sending of large files through the Listserv to a minimum and will put the files on the website for your downloading convenience.

The study found that teachers' lack of second language proficiency frustrated them during curriculum preparation. Moreover, a lack of teaching materials in Spanish prevented teachers from providing quality lessons. Some teachers suggested a few online search engines for finding materials and language tools, such as Yahoo and Google; however, they still needed someone to help them with the translations in person. A teacher expressed her frustration, "I do use freetranslation.com, but it is literal and the students give me funny looks sometimes after reading a translation!!" Another teacher, who had the same challenge, replied she had students translate who speak Spanish, and sometimes even their Spanish teachers in high school came to help in class. Collaborating with other members in school can be a good solution in solving problems.

Issues Showing Movies, Video Clips, and TV Shows in Public Schools

Teachers were concerned about content when selecting movies, videos or TV shows to use in class. *Super Size Me* and *Ratatouille* were the most discussed movies. Both movies have two edited versions because of their content appropriateness and the target market.

Although the educational version of *Super Size Me* is priced four times higher than the PG-13 version, three of the teachers thought that it was a good investment because the disc included review sheets, and it was divided into age groups with lots of interactive activities to do with the class. The disc can "play just the portion of the movie you want to discuss in each specific lesson." The thread first started because one challenge teachers had when showing the regular version to students was they had to create a study guide/a review sheet/discussion questions/activities themselves. Some teachers complained that the PG-13 version has one

vomiting scene, curse words, and discussion of private sex life. The educational version has deleted the scenes inappropriate for children.

Regarding *Ratatouille*, one teacher suggested this movie for the classes of Culinary Arts and Advanced Foods and Nutrition because "they use the correct culinary terms and even knife holding is correct!!". . . . and the kitchen scenes are true to life." One teacher was concerned about a rat cooking in a kitchen, but another teacher recognized it as an opportunity to address health and sanitation issues in the kitchen. Overall, the movie had more valuable topics (e.g., the arrangement of a professional kitchen, the different preparation methods used, and the hierarchy of management) to engage students in her classes. She further explained, ". . . ask students to evaluate the meaning of food in their families and how it can be used to celebrate holidays and traditions. . ."

Additionally, the legal issue of showing movies, videos and TV shows in schools was mainly associated with the local school policy. The listserv administrator specifically explained the terms stated in the law to the teachers through the listserv. Still, not all of the schools permitted teachers to use movies, video clips or TV shows in their classes even though other teachers recommended them and had positive experiences.

Issues of Teachers' Vague Understanding of Content

This section reports some teachers' inadequate understanding of food safety and sanitation principles and difficulties grouping foods based on *MyPyramid*. First, the study found some teachers may be unclear about how to properly store fermented foods and bakery products. One teacher wondered if it is unsafe to leave Amish bread unrefrigerated because of the fermentation. Another teacher just simply answered her, "It will be fine," but with no further explanation.

A similar confusion about proper food storage was revealed when teachers discussed whether Mayonnaise Cake should be refrigerated. A professor warned others about mayonnaise cake,

> I remember hearing about a family becoming quite ill from eating the cake because it had been left at room temperature. Since the mayo is combined with egg, maybe milk, and other ingredients, it should be refrigerated as soon as possible.

Two teachers did not have a problem with this type of cake when left at room temperature. One reason was because "The eggs in mayonnaise just like the other egg in cakes, don't lead to refrigeration once the cake is baked."

Choosing proper cleaning substances was many teachers' concerns. To prevent risk of foodborne illness, it is important for teachers to set an example by demonstrating good sanitation while teaching food labs. A teacher was using bleach water to clean her counter tops but she had heard it may be too harsh so she was seeking alternative suggests. Two teachers replied they use "hot, soapy dish water," 3% peroxide, or some brand of cleaning products; however, none of the teachers mentioned the suggestions made by the Partnership for Food Safety Education or any institutes with credibility for food safety.

When teachers were trying to expose students to a variety of foods, it was easy for them to feel confused about grouping ordinary ingredients (e.g., tea, coffee and cocoa beans) based on the food pyramid. A teacher was uncertain about how to categorize tea leaves, "Where do tea leaves fit??? Are they fruit / Veg? or just what. (We are enjoying the leaves). With green tea being so very healthy how do they fit into the pyramid????" Although teachers were familiar

with the history of tea, its origination in different countries, and recognized it as "a very good anti-oxidant", three teachers responded to the question and none of them provided accurate and comprehensive information. One teacher believed "the tea would fit into the same category as coffee. It's a drug."

Conclusion and Implications

The purpose of this study was to explore the contemporary issues confronting F & N teachers in secondary schools and to offer solutions through the use of professional listserv communities. Many perceived barriers were identified in teachers' reflective discourse. The findings provided suggestions and useful references for F & N teachers by addressing best practices and providing reliable resources within an online community, particularly when developing nutrition education curriculum, coordinating health programs, implementing wellness policies, and providing teacher support.

The implications of a professional listserv for F & N teacher support and informal professional development are threefold: (1) enhancing teachers' problem-solving skills, (2) retaining best practices, (3) updating information about new trends in food choices, new guidelines, and wellness policies.

First of all, food lab management, budgeting, purchasing, fundraising, grant writing, communication, and teamwork are necessary skills for F & N teachers. Professional listservs provide an avenue to acquire and hone these skills by expanding social networks and forming partnerships with national and local companies, accessing donations of damaged or unwanted goods from national corporations and local businesses, and forming partnerships with universities and community clubs. When there is a need, it would be an efficient way to collect donations, free products and even expertise (Hazzard *et al.* 2011).

Second, it is critical to pass down best practices in order to preserve fundamental content, to share reliable resources, and to model the efficient strategies and tools. This study revealed that e-mail listservs can be a valuable source to effectively support the needs of teachers by: (a) exchanging information, online resources, ready-to-use documents and lesson plans/activities/recipes, (b) informing new trends, (c) sharing personal experiences, opinions and students' work, and (d) brainstorming ideas without a huge investment of time. To maximize the advantages of participating in e-mail listservs, the study suggests that listserv subscribers collect and file all the useful information received from the listservs over time for future reference.

Internet and computer technologies gradually became these teachers' all-time favorite methods for teaching and learning; however, a cautionary note is warranted. When accessing information through online search engines, choosing appropriate keywords is key. Hazzard *et al*. (2011) found one reason some teachers did not receive enough funding information was because they narrowed down the search areas. This could be the case as well when searching for materials and information. Listserv administrators should encourage subscribers to share their search strategies and enclose keywords in the e-mails. In addition, a reminder about copyright laws and school policies should be addressed to avoid district and/or legal problems.

Third, within our multicultural environment, a wider variety of foods are available in grocery stores and students' homes. To equip teachers for what they will be teaching, continuing education programs and trainings need to address new trends in food choices and to update the information regarding new guidelines, health issues, and wellness policies.

Lastly, with respect to the application of e-mail listservs, we would suggest a professional e-mail listserv corresponding with the professional program be considered as a budget-saving

tool to encourage and support teachers' inquiry and their professional development. It provides a direct channel for teachers to make their voices heard.

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Technology Access and Use in North Dakota Family and Consumer Sciences Classrooms

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The purpose of this study was to examine what technology is available in the North Dakota family and consumer sciences (FCS) classroom, how technology is being used, and whether select demographic characteristics of family and consumer sciences teachers have an effect on the access to technology. An online survey tool was used to gather data. Over half (52%) of the approximately 180 FCS teachers in North Dakota completed the survey, with a total of 93 respondents. Descriptive statistics were calculated for the demographic questions (age, years teaching FCS, years teaching, grade level, and school size) and how technology was being used. Descriptive statistics were calculated along with multiple regression analysis on the questions dealing with technology access.

Technology is part of everyday life for most Americans. Many of today's students could be called "digital natives," having grown up surrounded by technology. These students do not even necessarily see technology as "technology;" they see it as a normal part of life. Jukes, McCain, and Crockett (2010) stated that digital natives "use digital technology transparently, without thinking about it, marveling at it, or wondering about how it works" (p. 15). One of the roles of family and consumer sciences (FCS) education is to prepare students for life. As technology is found in almost every home and workplace in the form of computers, cell phones, televisions, cars, and even kitchen appliances, it makes sense that FCS classrooms include technology as well. Manley, Sweaney, and Valente stated it is important that FCS teachers technologically prepare students for the future, as technology is becoming more pervasive in the school, home, and work environments (2000).

Several state and national entities have pointed out the importance of technology in FCS education, requiring that prospective FCS teachers be prepared to use technology. The National Council for Accreditation of Teacher Education (NCATE) states that all teacher candidates should be able to "present the content to students in challenging, clear, and compelling ways, using real-world contexts and integrating technology appropriately" (NCATE, 2008, p. 17), and "to select and develop instructional strategies and technologies, based on research and experience, that help all students learn" (NCATE, 2008, p. 17). The Interstate Teacher Assessment and Support Consortium (InTASC) incorporates technology within eight of their ten standards (InTASC, 2011). Specific to FCS, the National Standards for Teachers of Family and Consumer Sciences state prospective FCS teachers should be able to "facilitate students' critical thinking and problem solving in family and consumer sciences through varied instructional strategies and technologies" (NATEFACS, para 4, 2004). Lastly, many states require teacher preparation programs to include training in instructional technology. For example, the North Dakota Teacher Education Program Approval Standards for Family and Consumer Sciences requires that FCS teacher preparation programs include "the study of current, appropriate instructional technologies" and that the "program uses varied performance assessments of

candidates' understanding and abilities to apply that knowledge" (ND ESPB, 2005, p. 30). Even practicing FCS teachers themselves promote the use of technology in the FCS classroom. According to Harrison, Redmann, & Kotrlik (2000), FCS teachers feel that information technology is important.

Need for the Study

Technology for educational use is rapidly increasing and changing. Due to this change, it is important to continually explore where and how current technology is being used within the FCS classroom. Additionally, although research on technology use in the FCS classroom has been conducted in states such as Arkansas, Louisiana, Kentucky, New Mexico, and Mississippi, (Croxall & Cummings, 2000; Harrison, Redmann, & Kotrlik, 2000; Jenkins, Mimbs, & Kitchel, 2009; Loken, Cheek, & Hastings, 2003; Redmann, & Kotrlik, 2009; Rogers, Thompson, Cotton, & Thompson, 1993), there is no known publication of technology use in the northern plains states.

Purpose of the Study

The purpose of this study was to examine technology availability in the FCS classroom, how technology is being used, and whether select demographic characteristics have an effect on the access to technology. The objectives were to: a) describe selected demographic characteristics (age, years teaching, years teaching FCS, grade level taught, and school size) of FCS teachers in North Dakota, b) describe ND FCS teachers' access to various technology equipment, c) describe how technology is being used in the ND FCS classroom, and d) explore whether the demographics of FCS teachers in ND affect their technology access.

Literature Review

Digital Natives

The prominence of technology in education, and everyday life in general, is evidenced in many ways throughout American society. Many are "wired-in" or otherwise tethered to at least one piece of technology most of the time. Youth are particularly likely to exhibit this type of connectedness. Perhaps the most ubiquitous distinction relative to technology usage and familiarity amongst youth today comes with the emergence of the term "digital natives." Digital natives are comfortable with and used to being completely immersed in technology on various levels. "Kids growing up today live in a 600-channel television universe. It's a 10,000-station radio universe accessible online" (Jukes, McCain, & Crockett, 2000, p. 13). A 2010 study, the third of its kind conducted by the Kaiser Family Foundation, noted that children ages 8 to 18 spent an average of almost 10 combined hours a day engaged in activities involving television, music/audio, computer, or video gaming. The notion of combined consumption is based on the fact that for a substantial amount of the total time spent "connected," they were multi-tasking and, therefore, were occupied by two or more of these mediums at once (Rideout, Foehr, & Roberts, 2010).

There are distinctions in how technology is used, however, that often go unrecognized. The assumption that youth are adept at navigating all forms of technology equally is a common misperception. Just because youth send hundreds of texts, update social website profiles, and download music, sometimes simultaneously, does not mean those skills are similarly demonstrated when using technology for educational purposes such as research or problem solving. What is uncovered upon a closer look is that, often times, digital natives are "native" to

using technology only for entertainment purposes and as a tool for communication and other social aims (Brown, 2007).

Technology in Schools

Just as is the case within everyday life, technology has become a powerful and omnipresent tool within classrooms. Technological abundance has changed what tools are used in the classroom. Gone are the days of "chalkboards" and "blackboards." They are considered relics of yesteryear. A personal "notebook" in 2014 means something totally different than it meant in 1994. Technology as a learning tool involves the active use of technology by students in an exploratory and application-based manner, such as student-produced videos (Morgan, 2012), using wikis for peer editing (Kawahata & Chung, 2013), and student use of cell phones in the classroom (Thomas, O'Bannon, & Bolton, 2013). The vast availability of technology in classrooms has spread throughout the country. In 2009, the National Center for Educational Statistics (NCES) reported that "ninety-seven percent of teachers had one or more computers located in the classroom every day, while 54 percent could bring computers into the classroom" (Gray, Thomas, & Lewis, 2010, p. 3). In addition to having access to computers, the majority of teachers indicated their school or district had established networks that allowed them to utilize those computers for entering and monitoring data such as grades, assessment results, and attendance.

Due to the flexible nature and the myriad ways technology can be utilized, technological adoption and inclusion within schools is moving consistently and rapidly. Although extensive and sometimes complex in its variety of deliverable formats, technology usage has been grouped into three main categories. According to Inan and Lowther (2009), those categories are "technology for instructional preparation, technology for instructional delivery, and technology as a learning tool" (p. 138). These groupings are general enough that irrespective of the various and specific technological mediums, their uses are able to be described as fitting within one of the three categories. Technology use for instructional preparation might include activities such as using internet resources to research content matter and exchanging ideas with colleagues near and far. Using technology for instructional delivery might include using various mediums to construct and store content for future presentation and dissemination to students. Technology as a learning tool involves the active use of technology by students in an exploratory and application-based manner.

Technology in FCS Education

Technology has had a place in family and consumer sciences classrooms for as long as technology has been a part of daily life. Gaining computer access was one of the first hurdles to cross. According to Daulton (1997), 5% of Kentucky FCS teachers were using computers for educational purposes in 1982. Just 11 years later, in 1993, 83% of FCS teachers in Kentucky were reporting educational use of computers (Daulton, 1997). By 2007, 100% of FCS teachers in Kentucky had access to a desktop computer (Jenkins, Mimbs, & Kitchel, 2009). In 1989, Rogers, Thompson, Cotton, and Thompson found that FCS students spent much more time using a computer when the computer was located in the FCS classroom rather than a computer lab (1993). Harrison, Redmann, and Kotrlik (2000) found that Louisiana FCS teachers very strongly agreed that "teachers should know how to use computers and that teachers should have computers available for instruction" (p. 4).

Internet and email access became more widely available in the late 1990's and early 2000's. In 1998, Croxall and Cummings (2000) found that fewer than 25% of FCS teachers in

New Mexico had internet access in their classrooms and almost half had never used the internet in their teaching. At this point in time, word processing was the most common use of the classroom computer (Croxall & Cummings, 2000). Just a few years later, Manley, Sweaney, and Valente (2000) found that 93.8% of Georgia FCS educators used the internet, and 86.2% used email. In 2007, Jenkins, Mimbs, and Kitchel (2009) reported that 97.8% of FCS teachers in Kentucky had access to the internet at school, and 97.8% of FCS teachers used computers to access email. Internet and email access within schools has varied by state, as Redmann and Kotrlik (2009) found that 96.8% of Louisiana FCS teachers had a computer with internet access available at school, and 95.7% had an email account.

Additional technology has been showing up in FCS classrooms in the past few years, including electronic textbooks, interactive white boards, mp3 players, tablet computers, netbooks, digital cameras, and document projectors to name a few. When computer programs, internet applications, and apps for cell phones and tablets are added to this list, the possibilities for implementing technology in the classroom are endless and overwhelming.

Methods

Procedure

Data were gathered through an online survey tool. All persons teaching FCS in the state of North Dakota belong to the ND FCS listserv. An email inviting FCS teachers to participate in the online survey was sent over the ND FCS listserv, followed by three reminders over the next three weeks. Through this method, all FCS teachers in both funded and non-funded programs across the state were contacted. Ninety-three FCS teachers completed the survey, which is slightly over half (52%) of the approximately 180 FCS teachers in North Dakota. All respondents were female and were licensed to teach FCS at the middle school and/or high school level.

Instrument

The first section asked for demographics including age range, years teaching, years teaching FCS, grade level taught, and average graduating class size. The second section asked the participants to describe their access to 12 types of technology equipment in their classroom and asked how they and their students use 36 specific technology items (equipment, programs, online tools, etc.).

The questionnaire was reviewed for content and face validity by a panel of experts. These experts included state supervisors for FCS, current FCS teachers who had taken a course in using technology in the classroom during the previous summer, a university instructor, and a current undergraduate student majoring in FCS education. Each group brought a different yet important perspective. Each of these groups also checked for questionnaire readability and clarity. Approximately seven people provided feedback on the questionnaire.

Data Analysis

Descriptive statistics were compiled for the demographic questions (age, years teaching FCS, years teaching, grade level, school size). For the questions on access, descriptive statistics were calculated along with multiple regression analysis. Descriptive statistics were calculated for the question on use of technology tools by FCS teachers and their students.

As only 52% of the possible participants responded to the study, the researchers considered the possibility of a non-response bias. The answers to selected questions from the first third of the respondents were compared to answers to the same questions from the last third

of the respondents (Lindner, Murphy, and Briers, 2001), which improved the power of statistical comparison. The Cronbach's alpha for the first third was .367, and the Cronbach's alpha for the last third was .441, which indicated that there was no significant difference between the groups.

Findings

Demographics

The respondents were classified based approximately on their generational group. As there are many interpretations of how to define each generation, the following was used: those who were born after 1975 were classified as Generation Y, those born between 1961 and 1975 were classified as Generation X, and those born before 1961 were classified as Baby Boomers. Nearly two-thirds of the participants (63.4%) were Baby Boomers. Teaching experience ranged from zero to over 26 years. Almost half of the respondents (49.5%) were teaching at both the middle school and high school level. Forty-four respondents (47.8%) were at schools with fewer than 100 graduates per year, while 52.2% of the respondents were at schools with more than 100 graduates per year.

Access to Technology

The participants used a four-point scale to describe access in their classroom to each of 12 types of technology equipment (see Table 1) in which 1 = no access, 2 = potential access, 3 = limited access, and 4 = easy access. Scores were averaged to find the mean (*M*) and standard deviation (*SD*) for each item. Almost all FCS teachers had easy access to a computer for instructor use in their classroom (*M*=3.99) as well as internet access in their classroom (*M*=3.88). The items to which they had least access included netbooks (*M*=1.42) and tablets such as iPads (*M*=1.27).

Table 1

Access to Types of Technology Within the FCS Classroom, Arranged by Mean

Type of Technology Equipment	*n*	*M*	*SD*
Computer for instructor in classroom	93	3.99	.104
Internet access in classroom	91	3.88	.513
Computer lab you can reserve	92	3.51	.671
Digital camera	90	3.33	.960
Digital video camera	91	2.93	1.083
Document projector	92	2.82	1.309
Interactive white board	92	2.82	1.382
Portable laptops for classroom	92	2.76	1.142
Color copier/scanner	92	2.65	1.296
Cell phone/smartphone use by students in class	93	1.73	1.044
Netbooks	89	1.42	.877
Tablets such as iPads	89	1.27	.735

A one-way between-subject ANOVA was conducted to compare the effect of generation (IV) on access to various technologies (DV). Post Hoc comparisons using the Tukey HSD test were subsequently conducted. Comparisons are listed in Table 2. The comparison found that those in Generation Y were significantly more likely than Baby Boomers to have access to digital video cameras (p=.023).

Table 2

Access to Technology Compared to Generation

	Baby Boomer (*n*=19)		Generation X (*n*=15)		Generation Y (*n*=59)				
Technology	*M*	*SD*	*M*	*SD*	*M*	*SD*	*F*(2,89)	*p*	η2
Copier/scanner	2.73	1.298	2.00	1.254	2.94	1.211	2.543	.083	.054
Tablets	1.34	.815	1.29	.825	1.05	.229	1.085	.342	.025
Cell/smart phone use	1.83	1.162	1.47	.743	1.63	.831	.832	.439	.018
Instructor computer	4.00	.000	3.93	.258	4.00	.000	2.696	.073	.057
Computer lab	3.52	.707	3.47	.640	3.53	.612	.039	.961	.000
Portable laptops	2.90	1.05	2.40	1.242	2.63	1.300	1.287	.281	.028
Netbooks	1.48	.953	1.43	.938	1.21	.535	.678	.510	.015
Digital Cameras	3.31	1.046	3.50	.519	3.28	.958	.254	.777	.000
Digital video cameras	2.72*	1.152	3.21	.893	3.37*	.831	3.239	.044	.068
Document Projector	2.67	1.356	3.40	.986	2.79	1.316	1.882	.158	.040
Interactive board	2.97	1.364	2.43	1.399	2.63	1.422	1.069	.348	.023
Internet access	3.85	.582	3.87	.516	4.00	.000	.584	.560	.013

Note: The value of *p* was set a priori at the .05 level.
*Post hoc comparisons using the Tukey HSD test indicated that the mean scores were significantly different.

To compare the effect of years teaching FCS (IV) on access to various technologies (DV), a one-way between-subject ANOVA was used. Post Hoc comparisons using the Tukey HSD test were conducted. Comparisons are listed in Table 3. The findings showed that those who had taught FCS longer were more likely to have access to color copiers or scanners, digital cameras, and tablets such as iPads.

Table 3

Access to Technology Compared to Years Teaching FCS

	1-10 Years (*n*=33)		11-20 Years (*n*=26)		Over 20 Years (*n*=34)				
Technology	*M*	*SD*	*M*	*SD*	*M*	*SD*	*F*(2,89)	*p*	η2
Copier/scanner	2.69	1.330	2.15*	1.255	3.00*	1.206	3.319	.041	.069
Tablets	1.06*	.246	1.12*	.600	1.59*	1.012	5.390	.006	.111
Cell/smart phone use	1.52	.795	1.58	1.027	2.06	1.205	2.767	.068	.058
Instructor computer	4.00	.000	4.00	.000	3.97	.171	.865	.424	.019
Computer lab	3.42	.663	3.52	.714	3.59	.657	.498	.610	.011
Portable laptops	2.55	1.201	3.08	1.164	2.73	1.039	1.618	.204	.035
Netbooks	1.33	.758	1.23	.710	1.64	1.055	1.788	.173	.040
Digital Cameras	3.06*	1.124	3.20	1.080	3.68*	.535	3.863	.025	.082
Digital video cameras	2.94	1.162	2.77	1.177	3.06	.933	.521	.596	.012
Document Projector	2.82	1.310	2.56	1.417	3.00	1.231	.811	.448	.018
Interactive board	2.75	1.368	2.42	1.474	3.18	1.267	2.308	.105	.049
Internet access	3.84	.638	3.92	.272	3.88	.537	.189	.828	.000

Note: The value of *p* was set a priori at the .05 level.
*Post hoc comparisons using the Tukey HSD test indicated that the mean scores were significantly different.

The one-way between-subject ANOVA and Post Hoc Tukey HSD test were also used to compare the effect of years teaching any subject (IV) on access to various technologies (DV). Comparisons are listed in Table 4. Those who had taught over 20 years, like those who had taught FCS longer, were more likely to have access to digital cameras than those who had taught 11-20 years (p=.026). They were also more likely to have access to an interactive white board than those who had taught 11-20 years (p=.028) and were more likely to have tablets than the other groups.

Table 4

Access to Technology Compared to Total Years Teaching

	1-10 Years (*n*=26)		11-20 Years (*n*=28)		Over 20 Years (*n*=39)				
Technology	*M*	*SD*	*M*	*SD*	*M*	*SD*	*F*(2,89)	*p*	η2
Copier/scanner	2.60	1.323	2.25	1.323	2.97	1.203	2.667	.075	.056
Tablets	1.04*	.200	1.11*	.577	1.54*	.960	4.733	.011	.099
Cell/smart phone use	1.50	.762	1.57	.959	2.00	1.214	2.323	.104	.049
Instructor computer	4.00	.000	4.00	.000	3.97	.160	.688	.505	.015
Computer lab	3.35	.689	3.48	.700	3.64	.628	1.561	.216	.034
Portable laptops	2.65	1.198	2.86	1.208	2.76	1.076	.210	.811	.000
Netbooks	1.21	.509	1.32	.863	1.62	1.037	1.892	.157	.042
Digital Cameras	3.17	1.049	3.04*	1.126	3.64*	.668	3.889	.024	.082
Digital video cameras	3.04	1.136	2.71	1.182	3.03	.972	.831	.439	.018
Document Projector	2.88	1.336	2.44	1.368	3.03	1.224	1.647	.198	.056
Interactive board	2.81	1.386	2.30*	1.489	3.18*	1.211	3.432	.037	.072
Internet access	3.92	.400	3.93	.267	3.82	.683	.441	.645	.000

Note: The value of *p* was set a priori at the .05 level.
*Post hoc comparisons using the Tukey HSD test indicated that the mean scores were significantly different.

Again, the one-way between-subject ANOVA and Post Hoc Tukey HSD test were used to compare the effect of grade level taught (IV) on access to various technologies (DV) (see Table 5). The largest statistically significant differences in technology access were related to having access to an interactive board. Those who taught at both the middle school and high school levels had greater access to interactive white boards than those who taught at either the middle school (p=.001) or high school level (p=.000). In contrast, those who taught at both the middle school and high school levels had less access to document projectors than who taught at either the middle school (p=.020) or high school levels (p=.033).

Table 5

Access to Technology Compared to Grade Level Taught

	Middle School (*n*=17)		High School (*n*=29)		Middle and High School (*n*= 45)				
Technology	*M*	*SD*	*M*	*SD*	*M*	*SD*	*F*(2,89)	*p*	η2
Copier/scanner	3.00	1.225	2.36	1.311	2.64	1.300	1.327	.271	.029
Tablets	1.20	.775	1.07	.258	1.43	.900	2.261	.110	.050
Cell/smart phone use	1.65	.996	1.62	1.015	1.78	1.064	.233	.792	.000
Instructor computer	4.00	.000	4.00	.000	4.00	.000	.000	-	-
Computer lab	3.18*	.529	3.45	.827	3.69*	.557	4.057	.021	.084
Portable laptops	2.82	1.074	2.83	1.037	2.77	1.217	.025	.975	.000
Netbooks	1.56	1.094	1.38	.862	1.40	.828	.239	.788	.000
Digital Cameras	3.50	.730	3.28	.996	3.32	1.029	.290	.749	.000
Digital video cameras	3.31	.946	3.14	1.026	2.70	1.112	2.586	.081	.057
Document Projector	3.35*	1.057	3.14*	1.187	2.38*	1.353	5.274	.007	.107
Interactive board	2.19*	1.276	2.00*	1.336	3.51*	1.058	16.638	.000	.277
Internet access	3.82	.529	3.96	.192	3.84	.638	.545	.582	.012

Note: The value of *p* was set a priori at the .05 level.

*Post hoc comparisons using the Tukey HSD test indicated that the mean scores were significantly different.

Finally, a one-way between-subject ANOVA and Post Hoc Tukey HSD test were used to compare the effect of the size of a typical graduating class (IV) on access to various technologies (DV). Comparisons are listed in Table 6. Those who taught at larger schools were more likely to have access to digital video cameras and document projectors, while those who taught at smaller schools were more likely to have access to computer labs and interactive white boards.

Table 6

Access to Technology Compared to Typical Size of Graduating Class

	Under 100 Grads (*n*=44)		Over 100 Grads (*n*=48)				
Technology	*M*	*SD*	*M*	*SD*	*F*(2,89)	*p*	η2
Copier/scanner	2.78	1.263	2.51	1.334	.949	.333	.010
Tablets	1.40	.876	1.12	.504	3.433	.067	.038
Cell/smart phone use	1.88	1.130	1.57	.925	2.059	.155	.022
Instructor computer	3.98	.143	4.00	.000	.897	.346	.010
Computer lab	3.71*	.582	3.30*	.701	9.500	.003	.095
Portable laptops	2.77	1.242	2.75	1.037	.008	.931	.000
Netbooks	1.37	.799	1.47	.960	.262	.610	.000
Digital Cameras	3.34	1.006	3.33	.919	.005	.942	.000
Digital video cameras	2.69*	1.095	3.21	1.013*	5.528	.021	.058
Document Projector	2.33*	1.342	3.34	1.055*	15.824	.000	.149
Interactive board	3.37*	1.185	2.19	1.332*	20.270	.000	.183
Internet access	3.86	.612	3.90	.370	.192	.661	.000

Note: The value of *p* was set a priori at the .05 level.

*Post hoc comparisons using the Tukey HSD test indicated that the mean scores were significantly different.

Use of Technology by FCS Teachers and Students

The participants identified if and how they use each of a list of 36 types of technology, as well as how their students were using technology in their FCS class or in Family, Career, and Community Leaders of America (FCCLA), the student organization related to FCS. Descriptive statistics were compiled for this question. Participants were given the options of: "I do not use this," "I use this for things other than teaching," "I use this as an instructor/advisor," "my students use this as part of my class," and "my students use this as part of FCCLA." Participants were instructed to mark all options that applied. The percentage of answers in each category, along with the number of participants marking that choice, can be found in Table 7. The items with the highest percentage in each column are bolded. FCS teachers were most likely to use word processing (75%) and Power Point (72.9%) in their teaching or advising. YouTube (43.5%), interactive white boards (43.5%), and digital cameras (42.4%) were next likely to be used. FCS teachers reported students as mostly using word processing (59.5%), Power Point (49.4%) and digital cameras (34.1%) as part of class; and FCCLA students as using word processing (33.3%), Power Point (24.7%), and digital cameras (23.5%) as part of FCCLA. Students were reported as more likely to use cell phones, Facebook, Shutterfly and other photo sharing, texting, and Twitter as part of FCCLA than as part of class.

Table 7

Use of Technology by FCS Teachers and Their Students, as Reported by FCS teachers (n=93).

	Teacher Use			Student Use	
Technology (n)	% Use as instructor/ advisor (n)	% Non-teaching use (n)	% Do not use (n)	% Part of class (n)	% Part of FCCLA (n)
Animoto (86)	4.7 (4)	9.3 (8)	86.0 (74)	2.3 (2)	1.2 (1)
Blogs (85)	3.5 (3)	16.5 (14)	77.6 (66)	2.4 (2)	0.0 (0)
Cell/Smart Phone (86)	16.3 (14)	67.4 (58)	23.3 (20)	2.3 (2)	7.0 (6)
Class web page (85)	27.1 (23)	1.2 (1)	68.2 (58)	5.9 (5)	4.7 (4)
Digital cameras (85)	42.4 (36)	55.3 (47)	9.4 (8)	34.1 (29)	23.5 (20)
Doodle (85)	0.0 (0)	3.5 (3)	94.1 (80)	2.4 (2)	0.0 (0)
Edmodo (86)	4.7 (4)	2.3 (2)	93.0 (80)	1.2 (1)	0.0 (0)
Facebook (86)	4.7 (4)	58.1 (50)	36.0 (31)	0.0 (0)	5.8 (5)
Glogster (85)	5.9 (5)	2.4 (2)	82.4 (70)	9.4 (8)	1.2 (1)
Googledocs (86)	40.7 (35)	14.0 (12)	40.7 (35)	8.1 (7)	1.2 (1)
Google sites (85)	23.5 (20)	15.3 (13)	60.0 (51)	14.1 (12)	2.4 (2)
Interactive board (85)	43.5 (37)	4.7 (4)	44.7 (38)	30.6 (26)	8.2 (7)
Jing (84)	2.4 (2)	3.6 (3)	95.2 (80)	0.0 (0)	0.0 (0)
Mindmo (85)	0.0 (0)	2.4 (2)	97.6 (83)	0.0 (0)	0.0 (0)
Online role play (82)	0.0 (0)	1.2 (1)	**98.8 (81)**	0.0 (0)	0.0 (0)
Oovoo (85)	1.2 (1)	1.2 (1)	97.6 (83)	0.0 (0)	0.0 (0)
Photo sharing (85)	11.8 (10)	52.9 (45)	40.0 (34)	2.4 (2)	4.7 (4)
Podcasts (83)	2.4 (2)	8.4 (7)	89.2 (74)	1.2 (1)	0.0 (0)
Power Point (85)	72.9 (62)	16.5 (14)	7.1 (6)	49.4 (42)	24.7 (21)
Prezi (85)	7.1 (6)	1.2 (1)	88.2 (75)	5.9 (5)	2.4 (2)
Schooltube (84)	10.7 (9)	3.6 (3)	84.5 (71)	2.4 (2)	0.0 (0)

Shutterfly (86)	5.8 (5)	38.4 (33)	54.7 (47)	2.3 (2)	3.5 (3)
Skype (86)	4.7 (4)	34.9 (30)	58.1 (50)	3.5 (3)	1.2 (1)
Spreadsheets (85)	58.8 (50)	45.9 (39)	18.8 (16)	17.6 (15)	10.6 (9)
Survey Monkey (81)	30.9 (25)	33.3 (27)	38.3 (31)	6.2 (5)	3.7 (3)
Tablets (85)	8.2 (7)	12.9 (11)	80.0 (68)	4.7 (4)	0.0 (0)
Teacher Tube (85)	14.1 (12)	3.5 (3)	80.0 (68)	3.5 (3)	0.0 (0)
Texting (84)	14.3 (12)	**67.9 (57)**	23.8 (20)	8.3 (7)	13.1 (11)
Toondoo (84)	0.0 (0)	1.2 (1)	97.6 (82)	1.2 (1)	0.0 (0)
Twitter (85)	1.2 (1)	7.1 (6)	91.8 (78)	0.0 (0)	2.4 (2)
Virtual worlds (85)	0.0 (0)	1.2 (1)	**98.8 (84)**	0.0 (0)	0.0 (0)
Voki (85)	1.2 (1)	1.2 (1)	97.6 (83)	0.0 (0)	0.0 (0)
Wikis (85)	9.4 (8)	17.6 (15)	75.3 (64)	5.9 (5)	1.2 (1)
Word Processing (84)	**75.0 (63)**	52.4 (44)	1.2 (1)	**59.5 (50)**	**33.3 (28)**
Wordle (84)	17.9 (15)	8.3 (7)	75.0 (63)	10.7 (9)	2.4 (2)
YouTube (85)	43.5 (37)	43.5 (37)	29.4 (25)	18.8 (16)	10.6 (9)

Note. Some rows may add up to more than 100%, as participants were instructed to mark all answers that apply. Arranged alphabetically by type of technology. Highest number in each column is bolded.

Discussion

The purpose of this study was to examine what technology was available in the FCS classroom, how technology is being used, and whether select demographic characteristics have an effect on the access to technology. The 93 respondents described the access to technology in their classrooms and how technology is being used. Data from the previous tables will be summarized and discussed in this section, and comparisons will be made to previous studies.

Access to Technology

Almost all teachers had access to a computer within their classroom, as well as access to the internet. This is similar to the findings of Redmann and Kotrlik (2009) and Jenkins, Mimbs, and Kitchel (2009). Although they almost all had access to a computer and the internet, it was not determined whether any websites were blocked, thus limiting this access. Teachers reported least access to netbooks and tablets such as iPads.

Experience, but not necessarily age, seemed to correspond with easier access to technology. However, it is unknown as to whether there was increased use along with this easier access. Of the comparisons with significant difference, FCS teachers with 21 or more years of teaching FCS and/or other subjects had higher access to technology in each comparison while those with 0-20 years of teaching experience never had higher access to technology among the comparisons. Interestingly, Baby Boomers did not have significantly greater access to any technology tool, which highlights the difference between experience and age.

Teachers in large schools had easier access to two technology items (document projectors and digital video cameras) and teachers in small schools had easier access to two different technology items (computer labs and interactive white boards). This corresponds to an extent with the grade levels taught. Typically, FCS teachers in large schools teach only high school or middle school courses, while teachers in smaller schools teach both high school and middle school courses. Those who taught only middle school or high school had easier access to document projectors, similar to those who taught at large schools. Those who taught both middle school and high school reported easier access to interactive white boards, similar to those who taught at small schools.

Use of Technology by FCS Teachers and Students

Overwhelmingly, the most-used technology tools by both teachers and students were word processing and Power Point. Although many new types of technology have been developed in the past 14 years, this is in agreement with Croxall and Cummings's (2000) findings that word processing was the most-used computer technology in the FCS classroom. The results were also similar to that of Hirose (2011) in that 50% or more of teachers used word-processing, spreadsheets, and presentation software; and approximately 50% or more of teachers reported that students use word processing and presentation software in the classroom. Mindmo, online role play, and virtual worlds were not used by any instructors or students within the FCS classroom or FCCLA.

Limitations and Recommendations

This study is not without its limitations. It is possible that those who completed the questionnaire are more interested in and more comfortable with technology, although a Cronbach's alpha test was run to check for non-response bias. This study is also limited to one state and to the FCS content area. Additionally, this study only looked at what technology was being used in the FCS classroom and within FCCLA. It did not explore how FCS teachers could increase their use of technology nor search for specific examples of how technology could be used in the FCS classroom. This would be an excellent area for further study.

Additional research into technology use in other content areas and other states would be beneficial. However, with the constantly changing nature of technology, identical replications using the same instrument would not be feasible, as there are already new technologies on the market and in the classroom since this study was conducted. Also, as the Common Core State Standards focus on reading and writing, including choosing and referencing appropriate sources, another area for further study is whether youth are able to use technology appropriately for research and problem solving. A third area for further study is the ways in which students use technology in their relationships with family and friends, and whether curriculum on this topic should be included in FCS classrooms.

Implications

Although a variety of technology is present in FCS classrooms of all types across North Dakota, there is some concern as to whether the technology is being used to its fullest potential. Except for Power Point, spread sheets, and word processing, the technology tools listed within this survey were used by less than half of the FCS teachers and/or students in a classroom or FCCLA setting, with three-fourths of the tools being used by less than 25% of the teachers. Although technology should not be used simply for technology's sake, it is important to look at what teachers may need to more fully incorporate technology into their curriculum in ways that are meaningful and appropriate. It is also important to search out examples of the effective use of technology in FCS and other content areas and share these examples.

Additionally, to keep up with the society in which their students are living, FCS teachers may want to investigate possibilities for incorporating cell phone or smart phone use, as well as netbooks and tablets, into their curriculum. This is technology that students will most likely use in their everyday lives, both now and in the future, and they do need to learn to use them effectively and appropriately.

As technology is continually changing, there is a continual need for pre-service and in-service education on technology. As well as training on how to use the technology itself, FCS teachers need examples of how technology can be authentically used in the classroom. FCS

teachers also need to know how technology is being used within FCS-related careers so they can properly prepare their students for the workplace.

Conclusion

It is often said that FCS courses prepare students for life, so it is important that we prepare students for living in the current and future society, including the environments of school, home, and the workplace. Technology has become an integral part of these environments, and student must learn how to use technology effectively. "Our students have grown up in the technology age, as teachers we need to embrace and incorporate technology into the classroom to enhance the lesson by applying the content to real life without stepping outside the classroom" (Arnett & Freeburg, 2008, p. 54).

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A Profile of North Carolina Secondary Family and Consumer Sciences Teachers

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Secondary family and consumer sciences (FCS) teachers were surveyed to obtain demographic information, employment plans, and job satisfaction related to their teaching positions. Results indicated that typical respondents were middle-aged educators who taught FCS specialty courses on the block schedule. The majority of respondents were extremely satisfied with their teaching positions, as well as the perceived effectiveness of their FCS programs. Many were planning to retire within the next ten years.

The need for increasing numbers of family and consumer sciences (FCS) teachers has been well documented over the past several years (AAFCS, 1999; Lee, 1998; Miller & Meszaros, 1996; Rehm & Jackman, 1995; Werhan, 2013; Werhan & Way, 2006). According to Miller and Meszaros (1996), North Carolina was noted as being one of the top four states in need of large numbers of FCS teachers. In addition, a study (Moore & Lee, 2003) which focused on the number of FCS education majors in the southeastern states continued to show that the supply would be extremely short of the demand.

The most recent national profile of secondary teachers of all subjects indicated that the majority of teachers were between the ages of 30 and 50; approximately 10% were over 55 (U. S. Department of Education, National Center for Education Statistics, 1997). Several studies have reported public school teachers' low rates of satisfactions with their jobs (Dvorak & Phillips, 2001; Heiten, 2012; Landers, Alter, & Servilio, 2008).

The most recent studies which gathered information on secondary FCS teachers have generally differed from the national findings in two ways: (1) the average age of FCS teachers is generally older, thereby making a higher percentage of them eligible for retirement; and (2) FCS teachers are generally more satisfied with their teaching positions (Bartley & Sneed, 2004; Bull & Cummings, 2002; Bull, Urez, & Yoakum, 2000; Mimbs, 2000; Mimbs, 2002; Tripp, 2006). These studies were completed in different parts of the United States, including Connecticut, California, and Tennessee.

According to the North Carolina Department of Public Instruction, student enrollment in secondary FCS classes continues to grow. During the 2011-2012 school year, 127,187 middle and high school students completed FCS classes in North Carolina (T. LeGrand, personal communication, October, 2012), while in the 2013-2014 school year, there have been 134,682 FCS enrollments at the middle and high school level in North Carolina (S. Williams, personal communication, January, 2014). However, locating qualified teachers to teach these students has become more difficult. At least 10-15% of secondary family and consumer sciences teaching positions in North Carolina come open each year. In addition, of the approximate 1500 secondary FCS teachers in North Carolina, 42% have 30 or more years of teaching experience and are eligible for retirement (J. Meeks, personal communication, December, 2010).

Given the continuing shortage of FCS teachers in North Carolina, there was a need to document and better understand this scarcity of FCS teachers, as well as to obtain data regarding present family and consumer sciences teachers, including demographic information, employment

plans, and job satisfaction. The purpose of this research study was to compile a profile of North Carolina's secondary family and consumer sciences teachers in order to provide helpful recruitment and retention information for FCS teacher educators, secondary administrators, and Department of Public Instruction FCS consultants.

Procedures

An electronic survey was developed to obtain demographic information, employment plans, and job satisfaction of North Carolina's secondary FCS teachers. The survey was reviewed by the FCS state consultant and approved for sending to FCS secondary teachers. A cover message and the survey were sent electronically to 480 FCS teachers in Districts 4, 5, 6, 7, and 8 which were essentially in the western half of the state. Follow-up messages were sent via email to thank those who had returned their surveys and remind others to submit. Three hundred thirteen surveys, or 65.2%, were returned. The survey collected information on personal and teaching characteristics, school information, and teachers' perceptions and plans. Two open-ended questions at the end of the survey asked teachers to identify their biggest challenges and biggest rewards as FCS teachers. Data were analyzed using descriptive statistics.

Findings

In this study, 97% of the respondents were female. Approximately 85% were White, while 12% were African American; one respondent was Hispanic. Most respondents were 41-60 years of age (62%), 30% were 40 and younger, and 6% were over 60 years of age. Respondents' teaching experience was distributed as follows: 40% had taught 1-10 years; 28% had taught 11-20 years; 22% had taught 21-30 years; and 9% had taught over 31 years.

In terms of licensure, 57% had graduated from traditional teacher education programs; 38% were lateral entry; and 6% were provisionally certified. Eighty-two percent taught at high schools, while 18% were at middle schools. About half were in rural schools, and a quarter each were in urban and suburban settings. The majority (74%) taught FCS specialty courses (such as apparel, foods, housing, etc.) on the block schedule (80%).

Concerning overall job satisfaction, 84% of the respondents reported being satisfied or very satisfied with their positions and responsibilities. In particular, most of these teachers were very satisfied or satisfied with the FCS subjects they taught (94%), number of class preparations (76%), and administrative support for their programs (73%). Almost half of the respondents (46%) were not satisfied with their class sizes, reporting in open-ended responses that smaller class sizes would increase their job satisfaction. In addition, the majority of teachers were either not satisfied or only somewhat satisfied with their students' classroom motivation (65%) and behavior (67%).

Teachers were asked how effective they felt their FCS programs were in serving their students. Regardless of subject area, the majority of teachers reported their FCS programs as being very effective or effective in providing students with helpful career information (89%); helping students develop effective interpersonal (82%), communication (80%), problem-solving (79%), leadership (77%), and job readiness (88%) skills; and helping students develop healthy lifestyles (79%).

In terms of career plans, 90% of these teachers planned to remain in their current positions the following school year, and 50% planned to assume additional responsibilities (expand FCCLA involvement [29%]; pursue an advanced degree [26%]; increase involvement in professional organizations [25%]). Twenty-seven percent planned to retire in 1-5 years, while

18% planned to retire in 6-10 years. About 7% planned to retire at the end of the current school year.

Two open-ended questions were included at the end of the survey. When asked to list their biggest challenge, teachers most commonly responded that it was their students' lack of motivation and poor behavior in class. Other common challenges were: lack of money for class supplies, larger than desired class sizes, limited time for preparation of lessons, and lack of recognition for teachers. When asked to share their biggest rewards as a FCS teacher, teachers most often responded, the "light bulb" moments – when students learned a concept, achieved a skill, etc. Other rewards listed frequently were: making a difference in students' lives, teaching valuable life skills, getting students excited about learning, and helping students prepare for their future careers.

Discussion and Implications

About one-fifth (21%) of North Carolina's FCS teachers (N = ~1500) participated in this study. Similar to previous studies (Bartley & Sneed, 2004; Mimbs, 2002; Tripp, 2006), most respondents in this study were white, middle-aged females, supporting the fact that numerous FCS teachers in North Carolina are or will soon be eligible for retirement. Regarding teaching licensure, over half had received their teaching certification through traditional FCS teacher education programs; however, over one-third had obtained licensure through alternative programs, an increasingly common means of obtaining FCS teaching certification. Like those in earlier studies (Mimbs, 2002; Tripp, 2006), most respondents taught specialty courses at the high school level.

Consistent with other findings (Bartley & Sneed, 2004; Godbey & Mimbs, 2011; Mimbs, 2000, 2002; Tripp, 2006), the majority of these respondents indicated they were very satisfied with their current teaching positions and work responsibilities. In particular, teachers were satisfied with the FCS subjects they taught. Since the majority were teaching specialized courses, they were possibly teaching in the FCS areas they most enjoyed and/or were most competent, which would certainly contribute to high job satisfaction. When asked what would increase their job satisfaction, teachers' most common response was smaller class sizes. Perhaps the larger than desired class sizes contributed to students' classroom behavior problems, which also reportedly lessened teachers' satisfaction with their jobs. Still, teachers felt their programs were very effective in helping students develop valuable life skills, gather helpful career information, and embrace healthy lifestyles, and this positive perception of their programs likely contributed to their job satisfaction.

Of these respondents, almost half indicated they planned to retire in the next 10 years; this is consistent with other research (Bartley & Sneed, 2004; Mimbs, 2002). These numbers suggest that the current shortage of FCS teachers in North Carolina will continue, and while this may be welcome information to FCS education majors and upcoming graduates, it will be less well received by school administrators who continue to struggle to find qualified FCS teachers for open positions.

The information in this study is helpful to both FCS students and professionals. While the results are specific to North Carolina, they are consistent with other findings and therefore likely applicable to other regional programs. Students and others planning to become FCS teachers will note both the high job satisfaction expressed by these respondents, as well as the continued demand for FCS teachers. Higher education faculty can document for administrators the continuing need for graduates of FCS education programs, as well as characterize for their

students typical FCS teaching positions. Local secondary administrators and teachers, Department of Public Instruction staff, and other FCS professionals can utilize this information as they seek to improve the recruitment and retention of secondary FCS teachers. However, while the results of this study are helpful, further research related to family and consumer sciences teachers is needed to obtain data on a larger scale and from other parts of the country. Is the current profile of FCS teachers in North Carolina reflective of FCS teachers in other states? Are FCS teachers in other parts of the country also satisfied with their teaching positions and the quality of their programs? Will there be a substantial number of FCS teacher retirements across the country as there appears there will be in North Carolina in the near future?

Producing highly competent FCS teachers is essential to the survival of the profession. Comprehensive recruitment efforts at local, state, and national levels will be enhanced by the information gained in this study: the number of teaching positions due in part to an increasing number of retirements, as well as the high satisfaction levels of FCS teachers.

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Preliminary Outcomes of a Community Garden in Small Town Appalachia

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Teaching individuals and families how to attain food security has been a goal for many members of the American Association of Family and Consumer Sciences (AAFCS), yet many people still struggle with food insecurity, particularly in the Appalachian basin. Several negative physical health and psychosocial outcomes have been attributed to food insecurity among children and adults. Recognizing that food insecurity is problematic in their community, a local branch campus of a large university began a sustainability project by building a community garden on campus grounds. The primary aim of the project was to grow fruits and vegetables to be able to donate to the local food pantry. However, the campus garden provided more than just the fruits and vegetables it produced. The therapeutic benefits of gardening helped faculty, students, and community members increased their sense of well-being, and the garden provided an unconventional classroom, in which each gardener learned about beautification, composting and biofuels, and human nutrition. Because of its success, the community garden maybe considered a "Promising Practice" for FCS educators.

Food security for all people has been a common goal shared by many organizations. Educators in Family and Consumers Sciences have the unique opportunity to teach families about food security, and develop programs to strengthen food security within communities in need. The World Health Organization (WHO) posits that there are three facets of food security. First is food availability, which means that there are sufficient quantities of food readily available at all times. Second is food access, in that there are enough resources available for people to obtain the foods necessary for a nutritious diet. Third, food usage means that individuals have a basic knowledge of nutrition, understand how to use foods, and have access to clean water and sanitation (WHO/ICCIDD/UNICEF, 2007). Unfortunately for 870 million people around the globe, one or more of the facets are missing, resulting in a state of food insecurity (Food and Agriculture Organization of the United Nations, 2012).

Food Insecurity

Several negative physical health and psychosocial outcomes have been attributed to food insecurity among children and adults. Increased incidences of cardiovascular disease, type 2 diabetes, chronic fatigue syndrome, anemia, and iodine deficiency have all been found among people who are food insecure (Eicher-Miller, Mason, Weaver, McCabe, & Boushey, 2009; Fuller-Thomson & Nimigon, 2008; Holben & Pheley, 2006; Seligman, Bindman, Vittinghoff, Kanaya, & Kushel, 2007; WHO/ICCIDD/UNICEF, 2007). Hamelin, Habicht, and Beaudry (1999) found that families reported an increase in fatigue and illness related to food insecurity,

which resulted in a lack of concentration at school and low motivation to complete tasks either in the home or at work. Depression and anxiety have both been attributed to food insecurity. Whitaker and Phillips (2006) studied mother-child dyads and found that mothers who indicated food insecurity had higher rates of depression and anxiety than mothers who were food secure. Also, as mothers became more food insecure, their children engaged in more frequent problem behaviors (Alaimo, Olson, & Frongillo, 2001). Murphy, Wehler, Pagano, Little, Kleinman (1998) reported that children with food insecurity are twice as likely as their food secure peers to be absent from or tardy to school, and to be considered hyperactive by their teachers.

Outcomes Related to Living in Appalachia

In the Appalachian basin of northwestern Pennsylvania there lies a pocket of impoverished neighborhoods where food insecurity remains troublesome. In one small community of 14,000 residents, almost 30% of residents live below the poverty line, 500 people are homeless, and over 70% of the children are eligible for the free lunch program provided by the federal government (Pennsylvania Partnerships for Children, 2012; United States Census Bureau, n.d.). Research has shown that living in the Appalachian basin, individuals tend to experience more depression and psychological distress than others who do not live in Appalachian areas (Costello, Farmer, Angold, Burns, & Erkanli, 1997; McCulloch, 1995; Zullig & Hendryx, 2011). Substance abuse in Appalachia also occurs at a higher rate than it does in non-Appalachian areas (Johnston, O'Malley, Bachman, & Schulenberg, 2009; Pruitt, 2009; Spoth, Goldberg, Neppl, Trudeau, & Ramisetty-Mikler, 2001). Pettigrew, Miller-Day, Krieger, & Hecht (2012) interviewed 118 adolescents from schools within an Appalachian region. They found that 65% of the youth reported receiving explicit or implicit offers of illicit substances, and 39% had smoked tobacco, 37% had consumed alcohol, and 22% had smoked marijuana. Substance abuse is also correlated with suicide (Substance Abuse and Mental Health Services Administration, 2002; Rowan, 2001). In a study of 1330 adolescents, Beautrais, Joyce, and Mulder (2012) found that the adolescents who attempted suicide had significantly higher rates of marijuana use than adolescents with no suicidal ideations.

Benefits of a Garden

Wanting to make an impact in their community, faculty members researched the benefits of gardens and found that similar communities experienced a myriad of positive outcomes on both community members' physical and mental health. A study by Van Den Burg and Custers (2010) suggests that brief periods of gardening may be effective in relieving stress. Respondents in a study by Kingsley, Townsend, and Henderson-Wilson (2009) perceived a sense of social and spiritual connectedness as well as increased physical fitness as a result of their involvement in a community garden. D'Abundo and Carden (2008) interviewed members of 35 families from an impoverished area of eastern North Carolina who participated in a Community Garden Education Program. Participants in the program reported increased consumption of fruits and vegetables, and they also expressed a sense of pride in growing food that they could consume and share with neighbors and family members.

Purpose of the Project

Recognizing that food insecurity is problematic in their community, and the potential benefits of creating a garden, a local branch campus of a large university began a sustainability project by building a community garden on campus grounds. The primary purpose of the building the garden was to harvest produce to donate to the local food bank, but as the project

progressed, the team members realized that the garden was yielding much more than food. The project resulted in campus beautification, a greater sense of well-being among students, faculty, and community members, and a feeling of personal accomplishment by all.

Project Details

Approximately 20 faculty members and staff from Family and Consumer Sciences, Biology, and others reached out to community members for donations. Fortunately, two community gardening association were willing to contribute to the project. The associations donated the initial supplies, and pledged to continue supporting the garden indefinitely. Students were made aware of the project and were encouraged to participate in the building and maintenance of the garden. A core group of 10 students regularly participated in tending to the garden, while approximately 10 others would participate sporadically. For the initial season, three permanent beds were made, and a fencing structure was built. Both faculty and staff, and students participated in the planting, maintenance, and harvesting of the various fruits and vegetables that the garden produced. As the season progressed, approximately 15 community members, especially its more senior members, began to walk to the campus to tend to the garden.

Project Outcomes

The Harvest

The garden flourished and produced more fruits and vegetables than anticipated. Almost 180 pounds of zucchini were grown, along with full-size tomatoes, cucumbers, eggplant, mixed hot peppers, yellow pear tomatoes, bell peppers, lemon drop tomatoes, beans, lettuce, cabbage, basil, cubanelle peppers, and arugula. In total, the garden yielded over 500 pounds of food.

Throughout the season, 363 pounds of the produce was donated to a community food warehouse, where it was distributed to others in need through local food pantries. The local food pantries serve a number of social services agencies in the area including homeless shelters, centers for domestic violence, and family supportive services. Nearly 100 pounds of produce went to residents who live in neighborhoods that border the campus. These neighborhoods are part of the community housing authority, which provides or supplements housing for the elderly, individuals with disabilities, and individuals who are not able to leave their homes.

Well-Being and Personal Accomplishments

The campus garden provided more than just the fruits and vegetables it produced. The therapeutic benefits of gardening helped faculty, students, and community members increase their sense of well-being. Some gardeners reported feeling less stress after they had tended to the garden. One faculty member shared that she “felt ready to go back into the classroom after taking a break and tending to the plants.” A student shared that “the garden was a quiet place to study," and she "enjoyed being near nature.” Others felt a sense of renewal and peace by simply sitting near the garden, and acknowledged the value of having a quiet, peaceful place on campus where they could retreat for a few minutes of their day in order to tend to the plants. Many expressed that they made positive new social connections from working in the garden with other students, faculty, staff, and community members. An elderly gentleman said that he “enjoyed watching the progress of the garden,” and “liked talking with other people.” Another student shared that he enjoyed working alongside his professor in a project outside of the classroom.

Faculty and students also conveyed pride in taking part in growing a sizeable amount of produce in a small space that would be given to agencies that feed hungry people in their

community. Several gardeners mentioned the sense of accomplishment they received from helping with garden maintenance and seeing how large, healthy plants grew from small seeds.

Campus Beautification

Another outcome of the garden is that it served as a campus beautification project. The crime rate in the areas surrounding the community is much higher than the state average crime rate and is higher than the national average crime rate (PA Commission of Crime Prevention and Delinquency, 2012). Crowe (2000) suggests that clean, well-kept areas are a deterrent to crime, and Murphy (1999) suggests that community gardens have the potential to reduce area crime rates.

Experiential Learning

The garden also provided a conduit for students to learn about sustainability through agriculture. Most students involved in the project were unaware of the "gardening" process, including the planting, care, and harvesting of the produce. Mini science lessons about plant biology, soil ecology, drainage, organic and conventional gardening, and plant and human nutrition were informally taught during gardening times. Newer gardeners became familiar with fruits and vegetables that they had never been exposed to before, and learned how to prepare, eat, and properly store them for use when they are not in season. Gardeners learned about composting and biofuels, and how food they grow and garden waste, can be converted into usable energy. Gardeners discussed soil fertilization, plant diseases, and pest control, with emphasis on the benefits and disadvantages of both organic and conventional methods.

Conclusion

Yielding much more than fruits and vegetables, the garden provided an unconventional classroom, in which each gardener contributed their experiences and expertise regardless of their rank or position in the University and the community. The original aim of the project was to simply grow produce to donate to the local food bank. Not only was that aim achieved, but several other outcomes were noted. These included campus beautification, well-being, experiential learning, and personal accomplishment.

Future research projects may include collecting quantitative data on well-being, as well as student engagement. As the garden becomes more fruitful, it is anticipated that additional funding will be secured to grow the project. Faculty and students would like to add more vegetation, and be able to include other learning experiences such as cooking classes for students and the community members to demonstrate how to prepare the produce for snacks and meals. Another long term goal would be to have the resources available so that children would be included in tending to the garden. For the present, however, faculty, staff, students, and community members are enjoying the garden, and anticipate many more seasons of learning, growing and sharing together in this small Appalachian town.

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