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Bradley S. Barker, Ph.D.
University of Nebraska-Lincoln
(402) 472-9008
Fax (402) 472-9024
114 Agricultural Hall
Lincoln, NE 68583-0700
bbarker@unl.edu
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Debra K. Meier
Nebraska 4-H
114 Agricultural Hall
Lincoln, NE 68583-0700
dmeier1@unl.edu

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Bradley S. Barker, Ph.D. and Debra K. Meier
University of Nebraska-Lincoln

Abstract: Nationally, 4-H has placed renewed emphasis in the areas of Science and Technology as a way to prepare youth for the 21st century workplace. Home access may become necessary to youth as they develop science and technology literacy via 4-H programs. A survey was sent to a random sample of 1,414 Nebraska families from a total population of 13,516. The survey examined the percentage of families that have access to computers and the Internet at home, computer components, use characteristics and specific areas of interest in science and technology. Results indicate that 96 percent of Nebraska 4-H families have access to computers at home. Nearly 92 percent of families had a connection to the Internet with a majority using dial-up connections. Families are interested in technology programs focused on basic computer knowledge and office application. In science, 4-H families indicated environment sciences and botany were areas of interest.

Introduction

Nationally, 4-H has placed renewed emphasis in the areas of Science and Technology as a way to prepare youth for the 21st century workplace (The National 4-H Strategic Directions Team, 2001). In addition, new program delivery methods utilizing computers and the Internet have obtained increased importance in 4-H curriculum development, programming, and communications.

Therefore, participation in 4-H program areas will most likely require access to computers and to some extent the Internet. For example, the National 4-H Cooperative Curriculum Systems 2006 Geospatial curriculum will be delivered on four CD-ROMs with supplemental materials available via a website.

While over 92% of children have access to computers at schools their time may be limited since resources are shared with other students (U.S. Census Bureau, 2003). As a consequence, home access may become increasingly important to children as they develop science and technology literacy via 4-H programs.

According to the U.S. Census Bureau (2003) more than 39 percent of households do not have a computer and 45 percent do not have Internet access at home. The diversification of 4-H curriculum into science and technology program areas and the use of electronic delivery methods necessitate the examination of computer and Internet accessibility in 4-H households.

Purpose

The purpose of the study was to investigate what technologies Nebraska 4-H families have in their home. In addition, the study was conducted to identify areas of science and technology 4-H families thought were important. The objectives were to:

1) Determine the percentage of families that have access to computers at home and inventory the current state of their technology and describe computer use characteristics.
2) Determine the percentage of families that have access to the internet and determine potential barriers to access.
3) Determine specific areas of interest in science and technology as measured by a self-reported interests inventory

Procedure

Population

A random sample of 1,414 families out of a total population of 13,516 Nebraska 4-H families, was selected from the 2004 4-H Plus database. Randomly selected families were sent the paper-based survey via US mail with a pre-paid return envelope. A postcard was mailed approximately two weeks before the survey was mailed to inform selected families of the upcoming study. Follow-up postcards were sent after two, four and six weeks to participants who had not returned the survey.

Instrument

A 19-question survey was developed based on the U.S. Census Bureau's *Computer and Internet Use in the United States: 2003* survey instrument. The survey consisted of 19 questions with a variety of response scales including yes/no questions, 4-point Likert-type scales and one open-ended question.

To begin, respondents were asked if they had a computer, if not they skipped to question 12 of the survey. Questions 2 through 11 of the survey explored topics pertaining to computers such as operating system, year purchased, components and Internet access. Question 12 asked the main reason for not having a computer. Questions 16 and 18 utilize a 4-point Likert-type scale for questions regarding the priority of different technology and science areas where 1 = not a priority and a 4 = high priority. In questions 17 and 19 respondents were asked to rank the first, second and third most important technology and science areas.

Content Validity and Reliability

The overall response rate to the survey was 33.6 percent. The confidence interval at the 95% confidence level is 4.41 indicating that the responses are accurate 95% of the time plus or minus 4.41 points from the reported mean.

Since the majority of the survey comes from the U.S. Census, the questions have been pre-tested and reviewed by experts and therefore are deemed to be valid. The results of a Cronbach alpha test for homogeneity of the 19 item instrument revealed a very high standardized alpha coefficient (r=.96). The high reliability coefficient indicates that the test halves are highly correlated and the questionnaire has high internal consistency.

To address the potential of non-response error, the initial respondents were differentiated into two groups. The first group, early respondents, consisted of respondents that returned their surveys from April to the end of June, 2005. The second group, late respondents, consisted of respondents that returned the survey on July 1, 2005 up to the indicated due date. An independent samples t test was conducted to determine if there were any significant differences between the mean scores of early and late groups based on each question. No significant differences were found between the groups on any question in the survey including the existence of a computer in the household $t(20.66) = -.938$, $p = .359$, equal variances not assumed.

In addition, a random sample of 100 additional surveys was sent to the initial group's non respondents to determine if scores were significantly different than the initial respondents. Fifteen surveys were returned by the second-round respondents for a response rate of 15 percent. Due to low statistical power, the second round respondents were combined with the late respondents to create a new group with a sample size of 34 (Linder, Murphy & Briers, 2001).

Additional independent samples t test were conducted to determine if there were any significant differences between the mean scores of early respondents and the combined group of late respondents and second round respondents on the existence of a computer in the household and high-speed internet. No significant differences were found between the groups on the existence of a computer in the household $t(486) = .703$, $p = .482$ or the use of high-speed Internet access $t(468) = -1.39$, $p = .166$.

Results

Computer Characteristics

Overall, 96.4% of respondents said they had a computer at home. A majority of respondents use Windows XP (57.5%), followed by Windows 98 (21.9%) and Windows 2000 (10.5%) see Table 1. Close to 32% of 4-H families had two or more computers in the home with the newest computer being purchased in 2004 (26.3%) see Table 2. Most (93.8%) of computers systems had a CD-ROM, however, less than half (49%) had a DVD drive see Table 3.

Table 1

Current Operating System

	Operating System							
	WinXP	Win98	Win2000	WinME	Mac OSX	Other	Mac OS9	No Computer
Count	257	98	47	33	8	2	1	1
Percent	57.5%	21.9%	10.5%	7.4%	1.8%	.4%	.2%	.2%

Table 2

Year newest computer obtained

Year the newest computer was obtained								
	None	2005	2004	2003	2002	2001	2000	Before 2000
Count	1	54	119	89	61	36	46	48
Percent	.2%	11.9%	26.3%	19.6%	13.5%	7.9%	10.2%	10.6%

Table 3

Computer Components

Does your primary computer have the following																
	CD-ROM		DVD		CD-ROM Burner		DVD Burner		USB		Firewire		AGP		Wireless	
	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes
Count	28	427	232	223	154	301	351	104	151	304	360	94	357	97	395	59
Percent	6.2	93.8	51	49	33.8	66.2	77.1	22.9	33.2	66.8	79.3	20.7	78.6	21.4	87	13

Internet Access

Overall, 8.4% of respondents did not have access to the Internet. Most (53.1%) used a dial-up account; 20.9% had a DSL connection while 8.4% and 5.7% had cable and satellite connections respectively as shown in Table 4. A majority of respondents (51%) do not have high speed access. The most likely barriers to high speed access included costs (31.3%) and availability (16.4%) see Table 6. When connecting to the Internet, most respondents use Internet Explorer (85.9%) followed by Netscape Navigator (16.2%) and Mozilla Firefox (6.3%).

Table 4

Internet Access

Do you currently access the Internet using						
	Dial-up	DSL	No Access	Cable	Satellite	Other
Count	241	95	42	38	26	12
Percent	53.1%	20.9%	9.3%	8.4%	5.7%	2.6%

Table 5

High Speed Internet Access

Do you have high-speed Internet access			
	No internet access	Yes	No
Count	38	185	232
Percent	8.4%	40.7%	51.0%

Table 6

Reasons for not having high-speed access

Reason for not having high-speed Internet							
	Costs	Have high-speed	Not available	Don't need	Use elsewhere	Other	Privacy and Security
Count	149	137	78	26	15	6	5
Percent	35.8%	32.9%	18.8%	6.3%	3.6%	1.4%	1.2%

Computer Use

The primary reported uses of the computer in the home were school related (82.2%), Email use (79.8%), work related (57.1%) and games (50.1%) (Table 7). Other or secondary uses of the computer reported were: word processing (88.3%), Email (87.7%), and spreadsheet /database use (57.5%) (Table 8). Finally, 65.5% of the respondents indicated they had a digital camera and 24.2% indicated they had a digital video camera in the household.

Table 7

Primary computer use

Primary use of the computer at home												
	School - homework		Email		Work		Games		Other		No Computer	
	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes
Count	81	374	92	363	195	260	227	228	407	48	454	1
Percent	17.8	82.2	20.2	79.8	42.9	57.1	49.9	50.1	89.5	10.5	99.8	0.2

Table 8

Other uses of computer at Home

Other uses of the computer at home														
	Word processing		Email		Spreadsheets and database		Manipulate graphics and video		Web Pages		Programming		Other	
	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes
Count	53	401	56	398	193	261	326	128	336	118	418	36	411	43
Percent	11.7	88.3	12.3	87.7	42.5	57.5	71.8	28.2	74.0	26.0	92.1	7.9%	90.5	9.5

Note: 0ne respondent indicated they did not have a computer for 0.2%.

For those respondents that reported that they did not have a computer, 2.4% indicated the reason was that costs were too high while 0.9% indicated they could use a computer at another location (Table 9).

Table 9

Main reasons for not having a computer at home

Main reason for not having a computer				
	Have a computer	Costs are too high	Can use elsewhere	Other
Count	442	11	4	3
Row N %	96.1%	2.4%	.9%	.7%

Technology and Science Interest Areas

Participants were asked to indicate their interests' in areas of technology. The interest areas were scored on a 4-point Likert-type system where NOT = 1, LOW = 2, MEDIUM = 3, and HIGH = 4. Overall, the technology areas with the highest mean scores were basic computer knowledge and office applications where the mean scores were 3.47 and 3.42 respectively (Table 10). The results are also broken down by districts. In Nebraska there are four districts: the Northeast (NE), Southeast (SE), Panhandle (PH) and West Central (WC). Not surprisingly, when asked to rank the most important development areas, overall, 58% selected the basic computer knowledge area, followed by office applications (44%) and graphic arts (17%) (Tables 11-13).

Table 10

Technology Interest areas by district and total

District		Basic Computer Knowledge	Web Sites	Office Application	Graphic Arts	Digital Movie Creation	Computer programming	Network	GIS/GPS	Robots
NE	M	3.43	2.79	3.37	2.93	2.63	2.76	2.69	2.50	2.19
	n	135	134	133	134	134	133	132	124	127
	SD	.833	.716	.764	.717	.753	.780	.783	.781	.774
PH	M	3.62	2.79	3.50	3.00	2.60	3.00	2.91	2.69	2.40
	n	58	57	58	57	57	57	57	55	53
	SD	.721	.901	.731	.802	.863	.866	.851	.879	.840
SE	M	3.46	2.75	3.42	2.99	2.63	2.67	2.68	2.51	2.38
	n	197	201	200	199	200	198	197	170	185
	SD	.817	.805	.697	.703	.829	.878	.873	.885	.820
WC	M	3.43	2.86	3.45	3.11	2.74	2.73	2.88	2.73	2.66
	n	70	71	71	70	70	71	69	62	64
	SD	.827	.867	.789	.772	.912	.878	.883	.908	.859
Total	M	3.47	2.78	3.42	2.99	2.64	2.74	2.73	2.56	2.36
	n	465	468	467	465	466	464	460	416	434
	SD	.809	.800	.732	.731	.824	.856	.855	.865	.829

Table 11

Percentage break down of those areas ranked *MOST* important technology area.

	Most important area									
	Basic Computer Knowledge	Office Application	Missing	Web Sites	Graphic Arts	Program	Digital Movie Creation	Robots	GIS/GPS	Network
Count	278	62	38	31	28	10	10	7	7	5
Percent	58.4%	13.0%	8.0%	6.5%	5.9%	2.1%	2.1%	1.5%	1.5%	1.1%

Table 12

Percentage break down of those areas ranked *SECOND MOST* important technology area.

	Second important area									
	Office Application	Web Sites	Missing	Graphic Arts	Basic Computer Knowledge	Program	Digital Movie Creation	Network	GIS/GPS	Robots
Count	210	63	40	40	34	30	23	15	14	5
Percent	44.3%	13.3%	8.4%	8.4%	7.2%	6.3%	4.9%	3.2%	3.0%	1.1%

Table 13

Percentage break down of those areas ranked *THIRD MOST* important technology area.

	Third important area									
	Graphic Arts	Web Sites	Program	Missing	Office Application	Network	Digital Movie Creation	GIS/GPS	Basic Computer Knowledge	Robots
Count	210	63	40	40	34	30	23	15	14	5
Percent	44.3%	13.3%	8.4%	8.4%	7.2%	6.3%	4.9%	3.2%	3.0%	1.1%

The science interest areas with the highest mean scores were Environment Sciences, Botany, and Zoology, where the mean scores were 3.44, 3.42 and 3.33 respectively (Table 14). Overall, Environmental Sciences were ranked the most important development area by 25% of the respondents followed by Botany (21%) and Botany/Zoology (15%) (Tables 15-17). Again, the ranking for priority science development areas follows the ranking of science interest areas with Environmental Sciences ranked number one, followed by Botany and Zoology.

Table 14

Science Interest areas by district and total

District		Biochemistry (Molecular biology, photosynthesis, food chemistry)	Botany (Agronomy, horticulture, forestry, plant taxonomy, plant physiology)	Chemistry (Physical chemistry, organic chemistry pesticides, soil chemistry	Earth and Space Sciences (Geology, meteorology, geography, topography, mineralogy, archaeology)	Engineering (Civil, mechanical, aeronautical, electrical, bioengineering, lasers)	Environmental Sciences	Physics (Solid state, optics, acoustics, fluid and gas dynamics,)	Zoology (Animal genetics, entomology, animal ecology, anatomy, paleontology)
NE	M	2.91	3.31	3.12	3.02	2.99	3.46	2.80	3.24
	n	125	128	127	127	128	129	127	128
	SD	.730	.612	.662	.672	.748	.612	.749	.661
PH	M	2.96	3.47	3.09	3.22	3.25	3.40	2.80	3.47
	n	53	55	55	55	55	55	55	55
	SD	.831	.716	.800	.809	.865	.784	.826	.742
SE	M	2.89	3.45	3.17	3.17	3.07	3.43	2.74	3.30
	n	192	193	193	193	194	192	193	193
	SD	.743	.585	.651	.656	.749	.660	.767	.693
WC	M	3.09	3.54	3.16	3.36	3.01	3.49	2.85	3.48
	n	67	68	68	67	68	67	67	66
	SD	.883	.656	.803	.667	.782	.786	.744	.685
Total	M	2.93	3.42	3.14	3.16	3.06	3.44	2.77	3.33
	n	442	449	448	447	450	448	447	447
	SD	.775	.629	.697	.690	.769	.683	.764	.696

Table 15

Percentage break down of those areas ranked *MOST* important science area.

	Most important area								
	Environment	Botany	Missing	Zoology	Earth/Space	Biochemistry	Engineering	Chemistry	Physics
Count	118	90	73	66	33	33	30	24	7
Percent	24.9%	19.0%	15.4%	13.9%	7.0%	7.0%	6.3%	5.1%	1.5%

Table 16

Percentage break down of those areas ranked *SECOND MOST* important technology area.

	Second important area								
	Botany	Environment	Missing	Zoology	Earth/Space	Chemistry	Engineering	Biochemistry	Physics
Count	101	77	74	69	48	42	29	25	9
Percent	21.3%	16.2%	15.6%	14.6%	10.1%	8.9%	6.1%	5.3%	1.9%

Table 17

Percentage break down of those areas ranked *THIRD MOST* important technology area.

	Second important area								
	Missing	Botany	Zoology	Environment	Earth/Space	Chemistry	Engineering	Biochemistry	Physics
Count	83	74	71	59	52	45	42	24	23
Percent	17.5%	15.6%	15.0%	12.5%	11.0%	9.5%	8.9%	5.1%	4.9%

Limitations and Implementation for Practice and Research

Initially, it would appear that a limitation of this study was the low response rate. However, every effort was made to increase the response rate by sending out a pre survey notice and three follow-up reminders to non-respondents (Mangione, 1995; Salant & Dillman, 1994). Furthermore, participants were selected from a true random sampling of the population being studied, thereby increasing the statistical likelihood that the sample represents the population (Mangione, 1995).

Moreover, two techniques, comparing early to late responders and comparing initial-round responses to second-round responses, were employed to control for the non-response error and no significant differences were found (Linder, Murphy & Briers, 2001; Linder & Wingenbach, 2002). In addition, the findings of this survey are in-line with the U.S Census (2003) findings that 83.4 percent of families with children enrolled in grades K-12 have a computer at home.

This study asked three main questions:

- the percentage of Nebraska 4-H families with a computer at home,
- if 4-H families have access to the Internet, and
- to examine areas of interest in technology and science.

First, over 96 percent of Nebraska 4-H families have access to computers at home. In addition, a majority of these systems were less than three years old. Secondly, nearly 92 percent of families had a connection to the Internet from their home with a majority of families using dial-up connections. Finally, families are interested in technology programs focused on basic computer knowledge and office application. In science, 4-H families indicated environment sciences and botany were areas of interest.

The results of this study suggest that 4-H families in Nebraska have adequate computer technologies in their homes to take advantage of computer-based, on-line 4-H programs. The results also indicate that 4-H programs can be delivered over the Internet but that download speeds may be an issue with a majority of households using a low bandwidth dial-up connection. Therefore, hybrid delivery systems that utilize multiple technologies to deliver mediated content may be considered as an alternative delivery solution. A hybrid system would allow large media files to be delivered via a CD-ROM while linked to smaller media files that can be easily delivered on-line. Additionally, the use of DVD's may not be an appropriate delivery solution due to the slow adoption of DVD drives in home computer systems.

Conclusion

Due to the difference in demographics between states, the findings of this study cannot be generalized to the entire population of 4-H families in the country. However, the findings suggest trends in the adaptation of technology by Nebraska 4-H families thereby providing

directions for the Nebraska 4-H science and technology programs and the consideration of electronic delivery methods.

Additional studies are needed to clarify the results of this survey; especially in regards to comparing technologies at home in the rural areas of Nebraska with those in more densely populated areas of Nebraska. For the present, these findings suggest that no significant technological barriers exist in the homes of Nebraska 4-H families regarding 4-H science and technology programs and mediated delivery methods and that less than 9% of families would be currently excluded from participating in programs that required computers and Internet access at home.

These findings can also offer other youth agencies, serving rural populations, a method for obtaining household technology information and the demographics of the populations they serve. This type of information can provide means for new development in programming, curriculum, and communications.

References

Day, J.C., Janus, A., & Davis, J. (2003). Computer and Internet Use in the United States: 2003. U.S. Census Bureau . On-line: http://www.census.gov/prod/2005pubs/p23-208.pdf

Lindner, J. R., Murphy, T. H., & Briers, G. E. (2001). Handling nonresponse in social science research. *Journal of Agricultural Education, 42*(4), 4353.

Lindner, J. R., & Wingenbach, G. J. (2002). Communicating the handling of nonresponse error in research in brief articles. *Journal of Extension* 40 (6). On-line: *http://www.joe.org/joe/2002december/rb1.shtml*

Mangione, T.W. (1995). Mail Surveys: Improving the Quality. Thousand Oaks, CA: Sage Publications.

Salant, P., & Dillman, D. A. (1994**).** How to conduct your own survey. New York, NY: John Wiley & Sons.

The National 4-H Strategic Directions Team (2001). The power of youth in a changing world: The national 4-H strategic plan. On-line: http://www.national4-hheadquarters.gov/library/summary.pdf

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