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Use of Computer and Internet in Agricultural Extension as Perceived by Extension Workers

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Abstract

The purpose of this study was to determine computer and Internet use in agricultural extension by Extension Workers (EWs). This study used a descriptive-correlational design. Population for the study consisted of all extension workers (N = 320) in Isfahan Province, Iran. A stratified sampling technique and census was used to select EWs (n = 200). Overall, findings indicate that EWs have access to computers both at work and home. On average, they use computers approximately 6 – 8 hours per week and majority of them use the Internet on average of 1 – 4 hours per week. A majority of them reported "fair to high level" of skills in computer usage. For example, writing CDs, word processing, using computers for file management, and basic computer skills. However, extension agent's report "no to a low level" of skills relative to using excel, installing software, power point and micro soft access, Photoshop, statistical software, were the skills that EWs did not have. It was proved necessary to conduct a systematic assessment of training needs relative to computer and Internet use. Systematic training should be conducted in the areas that Extension Workers perceived to be less skill.

Keywords:
Extension, Agriculture, Information Technology, Applications, Internet

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INTRODUCTION

The development of computers and advancement in telecommunications provide numerous opportunities to obtain a variety of information – economic, agriculture, news and to use it for decision making (Omidi Najaf Abadi *et al*., 2009; Bheenick and Brizmohum, 1998). A host of researchers have examined the use of computers and Internet by extension workers in different parts of the world (Ahmadpour and Mirdamadi, 2010; Badragheh *et al*., 2010; Bheenick and Brizmohum, 1998; Chieochan *et al*., 2000; Gregg and Irani, 2004). Key findings from these studies suggest that computer and Internet use in agriculture, especially extension services has increased tremendously. This increase is mainly because of the advancement made in information technology.

Access to information by farmers and extension personnel and administers are critical to the agricultural development process and Iran is no exception. However, many challenges face developing nations relative to using information technology. The challenges include: 1) to equip extension centers with necessary facilities such as phone line and computer; 2) establishing AKIS Network – application of information technology; and 3) provide online networks, computer communications and digital interactive multimedia to facilitate dissemination of agricultural technologies (Fami, 2006).

Ommani and Chizari (2006) examined the use of information technology training needed by extension agents in Khuzestan province of Iran. They found that extension agents needed training in using tasks e-mail, the Internet, developing PowerPoint presentations, word processing and SPSS. In addition, they found significant relationship among age, income, position and attitudes toward using information technology. These variables explained almost 78% of the variance in the dependent variable.

Fallah Haghighi (2006) examined factors that influenced the use of information technology in agricultural extension. He identified four factors that influenced attitudes toward using information technologies in Iran. These included: effectiveness of extension, organizational environment, the qualities of the information material provided, and cost effectiveness of technology used in extension.

Ahmadpour and Mirdamadi (2010) identified major challenges in the application of E-learning in agricultural extension services in Iran. By using ordinal factor analysis; they classified factors into six major challenges in the following areas: financial, technical, supporting services, regulatory, cultural and human factors. Finally they discussed challenges and suggested solu-

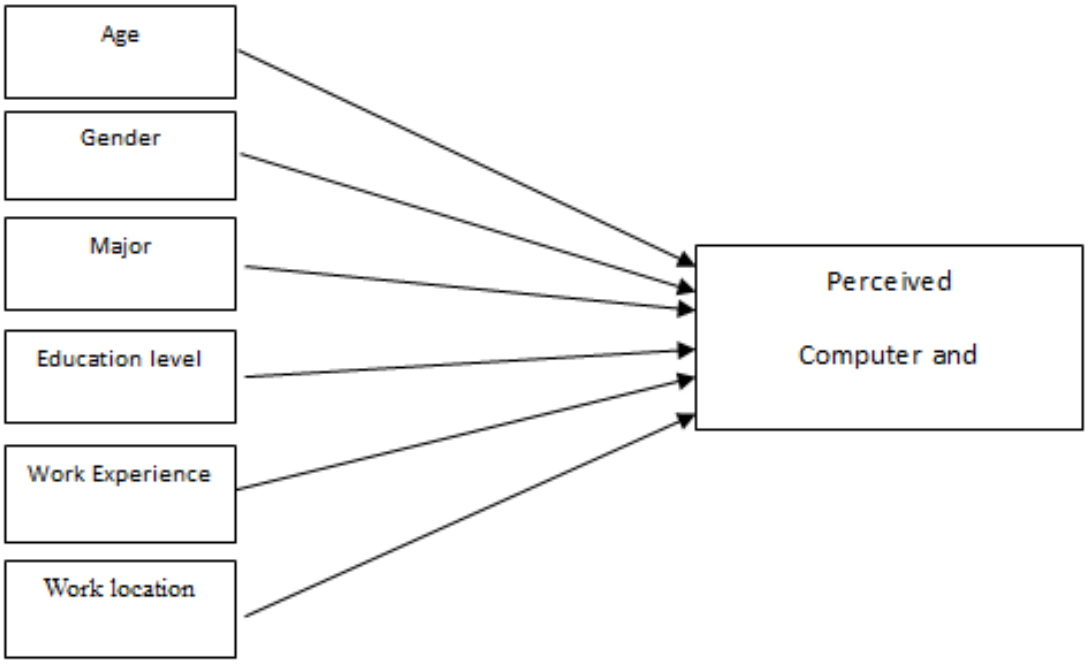

Figure 1: Conceptual Framework for the study

tions. In another study Omidi Najaf Abadi *et al*., (2009) Identified Requirements and Challenges of Information and Communication Technology System to Train Private Agricultural Insurance Brokers in Iran, too.

A number of studies have examined relationships among demographic and work characteristics and use of the computer and Internet (Ommani and Chizari, 2006; Fallah Haghighi, 2006; Akpabio, 2007). Based on this review of literature, a conceptual framework for the study was developed (see Figure 1). This framework identifies key demographic and work variables related to computer and Internet use. These variables include: age, gender, educational level, work experience, work location, and employment status.

Recognizing these factors is critical in expanding the use of information technology. A need exists to identify critical challenges. In Iran, increasing attention is being paid to information technology as an avenue to transfer technology in the agriculture sector. This increased attention is reflected in the recent Rural Information Communication Technology Strategic Plan.

Table1: Frequency and Percentage for Demographic and Job's Characteristics

Demographics Profile	f	%
Gender		
Male	154	87.0
Female	23	13.0
Total	177	100.0
Age*		
30 years and less	42	23.5
31 – 40 years	64	35.8
41 – 50 years	63	35.2
51 years and more	10	5.6
Total	179	100.0
Highest education completed		
High school diploma	18	10.2
Bachelors of art	33	18.6
Bachelors of science	104	58.8
Masters of science	22	12.4
Total	177	100.0
Major area of study		
Extension and education	17	9.5
Agronomy	50	27.9
Animal science	21	11.7
Other agricultural majors	64	35.8
Not related to agricultural major	27	15.1
Total	179	100.0
Work experience in agricultural extension**		
5 years and less	75	41.2
6 – 15 years	68	37.4
16 years and more	39	21.4
Total	182	100.0
Work location		
Provincial level	36	19.7
District (Shahrestan) level	51	27.9
County (Dehestan) level	96	52.5
Total	183	100.0
Employment		
Tenured	87	48.9
Tenured track	91	51.1
Total	178	100.0

*Mean of age = 37.83, SD = 8.16 and range between 23 to 55 years old.
** Mean of work experience = 9.42, SD = 7.57 and range between 1 to 29 years of experience.

Table 2: Frequency and percentage for computer and internet use

Computer and Internet Experience	f	%
Access to computer (including Internet and Web)		
Home	17	9.3
Work	38	20.8
Both	119	65
Laptop	5	2.7
No Access	4	2.2
Total	**183**	**100**
Total number of hours/week use computer (home + work)		
0.0 hour	4	2.2
1 to 4 hours	67	36.8
4.1 to 7 hours	41	22.5
7.1 hours & more	70	38.5
Total	**183**	**100**
Total number of hours/week use Internet (home + work)		
0.0 hour	28	16.6
1 to 4 hours	124	73.4
4 to 7 hours	12	7.1
7 hours & more	5	3
Total	**169**	**100**

Table 3: Means, Standard Deviations for Computer Skills

Competencies	n	Mean*	S.D	Rank
Writing CD	178	3.45	1.18	1
Using Computer and file management	179	3.42	o.97	2
Word processing	172	3.40	1.12	3
Basic Understanding of ICT	179	3.36	0.87	4
Excel	176	3.05	1.29	5
Install software	172	1.15	3.02	6
Presentation such as PowerPoint	171	1.20	2.74	7
Access	170	1.18	2.46	8
Basic problem solving with Software issues	169	1.25	2.23	9
Basic problem solving with Hardware issues	172	1.15	2.07	10
Photo Shop	173	1.05	2.03	11
Statistical software	172	0.99	1.89	12
Summated Scores	**179**	**10.63**	**32.18**	

* Mean computed on a scale 1 = none, 2 = little, 3 = fair, 4 = high

Purpose and objectives

The purpose of this study was to determine computer and Internet use in agricultural extension by Extension Workers (EW) in Isfahan Province of Iran. Specific objectives were:

1. To determine EWs job and demographic characteristics;
2. To determine EWs' computer and Internet use in extension;
3. To determine competencies (computer and Internet) among EW; and
4. To determine differences, if any, between perceived competencies and selected demographic characteristics.

MATERIALS AND METHODS

This study used a descriptive-core_ relational design. The population for the study consisted of all extension workers (N = 320) in Isfahan Province, Iran. Among whom 42 individuals were located in the agricultural organization of Isfahan province and the branch of the county management (N=70), were studied by census. For the selection of the required sample of the centers of

Table 4: Means, Standard Deviations for Internet Skills

Competencies	n	Mean*	S.D	Rank
Send E-mail	173	3.07	1.39	1
Understand E-mail operation	172	3.05	1.39	2
Search (Getting general information from sites)	171	3.01	1.42	3
Search (Getting information from special sites)	173	2.98	1.34	4
Attach File to E-mail	171	2.79	1.46	5
Internet Chat	172	2.34	1.41	6
Group News (Usenet)	172	1.88	1.03	7
Online Discussion	172	1.78	1.01	8
Membership in Internet Libraries	171	1.77	1.08	9
Develop Website	171	1.68	1.07	10
Summated Scores	**175**	**24.03**	**10.73**	

* Mean computed on a scale 1 = none, 2 = little, 3 = fair, 4 = high

providing agricultural services, the appropriate stratified sampling method was used that 200 answered questionnaire were returned, totally. A survey was developed to determine computer competencies and Internet use among EWs.

The survey was assessed for content and face validity by a panel of experts consisting of faculty members in the Departments of Agricultural Education and Extension, Penn State University, and extension officers in the Isfahan Province Agricultural Jihad Organization. The instrument was pilot tested using EWs (n = 30) in Isfahan Province who were not included in the study. Minor changes were made to improve the clarity and readability of the instrument. Cronbach's alpha, an internal consistency measure, was used to estimate the reliability. The reliability coefficient for part two of the instrument was found to be acceptable (alpha = .0.86)

Data were collected via normal mail. Of the 200 surveys mailed, 110 (55 %) were returned within four weeks. A follow up mailing was sent to non-respondents four weeks after the initial mail. As a result, an additional 75 responses were received. In all, 183 (95 %) surveys were returned. Data were analyzed using frequencies, percentages, means, and standard deviation. For the fourth research objective, analysis of variances (ANOVA) was used to compare demographic variables and computer skills.

RESULTS

Objective 1: Demographic Profile of Respondents.

The majority of the respondents were male (see Table 1) and the respondents' age was distributing evenly among three groups (23.5% under 30 years; 36.0% between 31-40 years and 35.0 % between 41-50 years). Three of five respondents (59%) had completed the Bachelor of Science degree. Nearly 28% reported agronomy as their major of study followed by a major other than agriculture (15.1%). 11.7 % had studied in animal sciences and only 9.5 % had agricultural extension and education degree. A little over one-third of the respondents (35.8%) indicated their major area of study in other agricultural subjects such as farm machinery, plant pathology, food science, irrigation engineering, and horticulture. On average, respondents had 9.4 years of work experience and a little over one-half of the respondents (52.5%) had worked in offices at county level.

Objective 2: Use of Computers, and the Internet in Extension

Use of computers and the Internet by respondents was examined using three factors – access to computers, total number of hours per week of computer use and total number of hours per week on the Internet (Table 2). Almost three out of every four respondents (73.4%) used the Internet one-to four hours per week.

Objective 3: Computer and Internet Competencies

Competencies of respondents in relation to computer skills was assessed using a five-point scale that ranged from 1 (none) to 5 (very high), see Table 3. Overall, respondents indicated a "fair to high" level of computer skills (Table 3). However, respondents indicated that their level

Table 5. ANOVA table for comparing demographic variables and computer skills**

Variable	n	M*	SD		
Age	41				
30 years old and <	64	36.58A	9.36		
31 to 40 years old	70	33.09A	11.36		
41 years old and >	175	28.44B	9.58		
Total		32.05	10.68		
Source	**SS**	**df**	**MS**	**F**	**Sig**
Between groups	1823.877	2	911.938	8.70	<0.001
Within groups	18028.660	172	104.818		
Total	19852.537	174			
Education					
High school diploma/B.A.	49	26.82	8.99		
Bachelors of science	104	32.72	10.52		
Masters of science	22	40.22	8.87		
Total	175	32.01	10.67		
Source	**SS**	**df**	**MS**	**F**	**Sig**
Between groups	2859.853	2	1429.927	14.52	<0.001
Within groups	16938.1244	172	98.477		
Total	19797.977	174			
Major of study					
Agronomy major	67	34.97	10.41		
Other agricultural major	83	32.11	10.15		
Not agricultural major	25	25.96	10.31		
Total	175	32.32	10.62		
Source	**SS**	**df**	**MS**	**F**	**Sig**
Between groups	1485.510	2	742.755	7.04	<0.001
Within groups	18156.924	172	105.564		
Total	19642.434	174			
Work experience					
5 years of experience and <	73	35.90	10.46		
6 to 15 years of experience	66	30.36	9.99		
16 years of experience and >	39	28.51	10.18		
Total	178	32.23	10.60		
Source	**SS**	**df**	**MS**	**F**	**Sig**
Between groups	1754.211	2	877.106	8.39	<0.001
Within groups	18295.345	175	104.545		
Total	20049.556	177			
Work location					
Provincial office	34	35.35	10.86		
Region office	51	31.63	9.95		
County office	94	31.34	10.80		
Total	179	32.18	10.63		
Source	**SS**	**df**	**MS**	**F**	**Sig**
Between groups	424.124	2	212.062	1.89	0.153
Within groups	19692.793	176	111.891		
Total	20116.916	178			

* Mean computed on a scale 1 = none, 2 = little, 3 = fair, 4 = high, and 5 = very high
** Mean could range from a low of 12 to a high of 60 with a theoretical midpoint of 38

Table 6. ANOVA table for comparing demographic variables and internet skills**

Variable	n	M*	SD		
Age					
30 years old and <	41	30.17A	11.37		
31 to 40 years old	63	24.40	11.08		
41 years old and >	67	19.46	8.45		
Total	171	23.85	10.73		
Source	**SS**	**df**	**MS**	**F**	**Sig**
Between groups	2946.506	2	1473.253	14.88	<0.001
Within groups	16631.541	168	98.997		
Total	19578.047	170			
Education					
High school diploma/B.A.	46	17.85	7.22		
Bachelors of science	103	24.23	10.45		
Masters of science	22	36.45	7.56		
Total	171	24.09	10.81		
Source	**SS**	**df**	**MS**	**F**	**Sig**
Between groups	5157.887	2	2578.944	29.47	<0.001
Within groups	14713.797	168	87.582		
Total	19871.684	170			
Major of study					
Agronomy major	67	25.81	11.25		
Other agricultural major	80	24.01	10.82		
Not agricultural major	24	19.87	8.30		
Total	171	24.13	10.79		
Source	**SS**	**df**	**MS**	**F**	**Sig**
Between groups	623.816	2	311.908	2.73	<0.001
Within groups	19186.090	168	114.203		
Total	1989.906	170			
Work experience					
5 years of experience and <	73	27.62	1.27		
6 to 15 years of experience	66	21.41	10.16		
16 years of experience and >	35	21.46	9.60		
Total	174	24.02	10.76		
Source	**SS**	**df**	**MS**	**F**	**Sig**
Between groups	1624.008	2	812.004	7.55	<0.001
Within groups	18401.901	171	107.613		
Total	20025.908	173			
Work location					
Provincial office	34	25	10.83		
Region office	50	22.58	10.27		
County office	91	24.46	10.97		
Total	175	24.03	10.73		
Source	**SS**	**df**	**MS**	**F**	**Sig**
Between groups	154.062	2	77.031	0.667	0.515
Within groups	19872.795	172	115.540		
Total	20026.857	174			

** Mean could range from a low of 12 to a high of 60 with a theoretical midpoint of 38

of computer skills was somewhat limited.

Respondents were asked to indicate their level of skills using various aspect of the Internet, see Table 4.

Objective 4: Differences in Perceived Competencies and Demographic Characteristics.

Significant differences were found between select demographic characteristics (age, education level, major area of study, work experience, and work location) and use of computer and Internet skills.

ANOVA results indicated significant differences [F (2, 172) = 8.70; p = .001] between the age and computer and Internet skills, see Tables 5 and 6. Younger extension workers (under 40 years old) tended to possess higher skills than those educators who were 42 and older.

In the ANOVA results between the demographic characteristic and Internet skills, gave the same results of Tables 5. In this case, indicated significant differences [F (2, 171) = 14.88; p = .001] between the age and Internet skills, too. Younger extension workers (under 40 years old) tended to possess higher skills than those educators who were 42 and older.

CONCLUSIONS AND RECOMMENDATIONS

Overall, findings indicate that extension workers have access to computers both at work and home. On average, they use computers approximately 6 – 8 hours per week and majority of them use the Internet on average of 1 – 4 hours per week.

Significant differences were found between key demographic variables (age, highest education level, major of study, work experience, and work location) and computer and Internet skills. Scheffé post hoc analysis revealed the following difference:

Younger extension workers (under 30 year) exhibited high level of both computer and Internet skills than older extension workers (41 year and older). This finding mirror with other findings reported in the literature (Table 5) and confirms findings Ommani and Chizari, 2006; Fallah Haghighi, 2006; Akpabio, 2007.

Extension workers with master's degrees reported significantly higher levels of computer and Internet skills than workers who had completed bachelor's degrees and agents with high school diplomas. Extension workers with bachelor's degrees reported higher skills when compared to workers with high school diploma.

More experienced extension workers reported lower levels of computer and Internet skills than less experienced (5 year or less) extension workers. This finding mirrors several studies reported in the literature regarding experience and computer skills such as: Ommani and Chizari, 2006; Fallah Haghighi, 2006; Akpabio, 2007.

Based on the findings and conclusion of this study the following recommendations are offered to make informed policy and programmatic decisions relative to computer and Internet use by extension in Isfahan Province of Iran.

First, need exists to conduct a systematic assessment of training needs relative to computer and Internet use extension workers. Such identification will help in characterizing a training program for extension workers to enhance their skills in computer and Internet use.

Second, systematic training should be conducted in the areas that extension workers perceived that they possessed less skill. For example, training should be offered in the areas of photo shop, power point, and statistical software.

Third, careful assessment of training needs relative to computer and Internet should be undertaken kept in mind the work-related characteristics such as work location, experience, etc.

Fourth, offering training/workshops, on computer and Internet emphasis should be given to age, education level and experience of extension workers. In order for training to be effective, staff development in Iran should consider separate tracks for training. For example, offer training (from basic to advance for older and experienced extension workers).

Finally, as computer and Internet dominate the information explosion, periodic upgrading of skills, software and hardware should be provided. Such effort will reduce the regional imbalances relative to equipment, both software and hardware.

This finding should be shared with all regional and provincial administration to make informed decisions relative to allocates resources for enhancing computer and Internet in Iran.

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