Determining Factors and Levels of E-skills among Agriculture Experts of Krishi Vigyan Kendras in India

R. B. Kale1*, M. S. Meena1, and P. P. Rohilla1

ABSTRACT

Information and Communication Technology (ICT) is one of the emerging driving forces to disseminate the agricultural knowledge. Skilled extension personnel can grab these opportunities for the diffusion of agricultural technologies to farming community. Therefore, the present investigation measures E-skills among agricultural experts of Krishi Vigyan Kendras (KVKs) — Farm Science Centers in Rajasthan and Gujarat states of India. Data were solicited from 87 proportionately selected agricultural experts from 29 KVKs. E-skills of experts were measured on 5-point Likert-type scale. The high level of E-skills among agricultural experts were identified in internet browsing, e-mailing, Micro-Soft (MS) Word, MS PowerPoint and mobile use for sending the text messages. The agricultural experts’ training on ICTs had a positive and significant relationship with E-skills while experts’ age had a negative effect. Elementary in use of ICT, analytical use of ICT, use of mobile phone for communication and use of ICT for mass communication were the major factors that governed the E-skills. The total variance explained by these factors was found 74.88%. Tactical E-skills, informative E-skills, formal E-skills and communicative E-skills were identified as important levels of E-skills in order of their expertise. Hence, the study recommends to encourage the young professionals and to impart more ICT based trainings for improving the E-skills of agricultural experts towards tactical level of E-skills.

Keywords: Agricultural experts, E-skills, ICTs, Krishi Vigyan Kendra.

INTRODUCTION

Information and Communication Technology (ICT) has a key role for social developments in this era of information society. During the last decade, research approach on the issue of ‘digital divide’ was focused on the binary classification of the gap between those who have and do not have access to computers and the internet (Van Dijk, 2005). Nowadays more refined approaches for understanding digital divide have appeared (e.g. DiMaggio and Hargittai, 2001; Mossberger et al., 2003; Van Dijk, 2005). Although earlier evidences showed the digital divide as an issue of access, it became increasingly noticeable that digital skills are the decisive factor with respect to reaching beneficial outcomes. Presently, the digital divide has increasingly been considered as a skills divide. Availability of huge information on the internet and to meet the timely need of information, the importance of skills on Information and Communication Technologies also increased (Steyaert, 2002). The level of e-skill has a strong effect on the ICT use of individuals once they have attained physical access (Hargittai, 2003; Livingstone et al. 2005; Mossberger et al., 2003; Norris, 2001; Van Dijk, 2005; Warschauer, 2003). It is being progressively recognized that internet and computer skills are not equally distributed in the society. E-skills are the capabilities required for effective application of ICT systems and devices by the individual in the

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chosen area of work (European E-Skills Forum, 2004). Van Dijk (2005) categorized the E-skills as operational, information, and strategic E-skills. Operational E-skills are the skills to operate computer and network hardware and software and can be seen as an equivalent to instrumental E-skills. Information E-skills are the skills to search, select, and process the information in computer and network sources. Finally, strategic E-skills are the competences to use these sources as the means for specific goals. Van Deursen et al. (2014) further added communication skill to the internet skills.

In India, agriculture is becoming more science driven and knowledge intensive. It requires a dynamic information flow from agriculture experts to the farming community. Indian public extension system has become more time consuming, costly and less effective to meet the current information demand (Mruthyunjaya and Adhiguru, 2005) with a wide variation in the extension workers to farmers, i.e., 1:300 in Kerala and 1:2,000 in Rajasthan state (Raabe, 2008). Recent developments in ICTs could facilitate the fast flow of information delivery to the farmers (Ali, 2013; Maningas, 2006) and enable better adoption of improved farming practices (Mittal and Tripathi, 2009). Krishi Vigyan Kendras (KVKs) — Farm Science Centers is the important district based extension system and knowledge center for the farmers. Hence, the skills on the part of agricultural experts are very much needed for the efficient diffusion of agricultural knowledge. A recent study by Kale et al., (2015b) reported that experts of the KVKs had a positive perception towards ICTs for the extension work. It shows an ample scope to harness the benefits of ICTs in service delivery of the extension system. Agricultural experts’ with higher education and who got trainings in ICTs had a positive effect on the perception regarding the use of ICTs. The aged scientists with higher working experience did not have a positive effect. Lack of knowledge of best practices in Information Technology (IT) and associated skills in workforce, are constrained in the wide use of ICT (Kaushik and Singh, 2004). It is also observed that public extension personnel are unwilling to collaborate with the ICT project, since most of them never used the internet and lack skills in using other ICT tools (Saravanan, 2008). Therefore, skilled extension personnel are required to avail ICT opportunities for better avenues in the areas such as training, distance education, extension management, communication, administration, health, education, and knowledge sharing (Meena et al., 2012). ICT tools are highly useful in all the activities such as preparing presentations for training, conducting surveys, research data analysis, reporting, coordination, farmers’ advisory services, transfer of technologies, etc. (Mahalakshmi et al., 2008; Sivakami and Kumaran, 2009; Kumaran, et al., 2011; Kale et al., 2015a). To implement these initiatives in a sustainable manner, agricultural experts should have proficiency in using ICTs. Proficiency in use of ICT tools in extension work was identified as an important e-skill for agricultural extension functionaries (Movahedi and Nagel, 2012). However, the focus of these studies on E-skills of the stakeholders engaged in agricultural technology transfer is very scanty. Therefore, a study was undertaken to measure the level of E-skills with its associated factors among the agricultural experts of KVKs.

**MATERIALS AND METHODS**

The study was undertaken during 2012-2013 at ICAR–Agricultural Technology Application Research Institute (ICAR-ATARI), Jodhpur, India. The ATARI, Jodhpur coordinates 70 KVKs functioning in Rajasthan and Gujarat states. A proportionate random sampling technique was adopted in selecting the KVKs. Out of a total of 57 KVKs (during year 2012), 29 KVKs (16 from Rajasthan and 13 from Gujarat) were
selected. Data were solicited from randomly selected three agricultural experts from each KVK, constituting a sample size of 87 for the investigation. A scale with 17-items was designed to measure the E-skills among the experts of KVKs. The experts were asked to respond on a Likert-type 5-point continuum scale. The scores were assigned as: 5= Excellent, 4= Very good, 3= Good, 2= Fair, and 1= Poor. A multiple linear regression model was employed to study the effect of personal variables on E-skills of agricultural experts. The following functional formula has been used:

\[ Y_i = \alpha + \beta_1X_{1i} + \beta_2X_{2i} + \beta_3X_{3i} + \beta_4X_{4i} + \beta_5X_{5i} + U_i \]

(For \( i = 1 \) to \( n \) number of respondents)

Where, \( Y_i \) = E-skills of \( i^{th} \) respondent; \( X_{1i} \) = Age (in years) of \( i^{th} \) respondents; \( X_{2i} \) = Working experience (in years) of \( i^{th} \) respondent; \( X_{3i} \) = Dummy variable for designation of \( i^{th} \) respondent (0= Programme coordinator and 1= Subject matter specialist); \( X_{4i} \) = Dummy variable for education of \( i^{th} \) respondent (1= PhD. and 0= MSc.); \( X_{5i} \) = Dummy variable for training of \( i^{th} \) respondent (0= No training acquired on ICT and 1= Training acquired on ICT); \( \alpha \) = Intercept, \( \beta_1 \) to \( \beta_5 \) are the partial regression coefficients.

However, considering the problem of multi-collinearity, stepwise regression was used to identify the relevant independent variables that influence the E-skills of respondents. Factor analysis (Aaker et al., 2003) has been widely used to identify the underlying dimensions or constructs in data and to reduce the number of variables by eliminating redundancy. Youssef et al., (2013) used Principal Component Analysis (PCA) followed by K-Mean non-hierarchical cluster analysis to characterize the different modes of internet usages and skills among the students. For assessing the factors governing E-skills, Principal Component Analysis (PCA) method was employed for reducing the number of variables (17) to fewer significantly meaningful factors. The items were used to assess the factors governing the E-skills of respondents. The functional form is as:

\[ Y_e = \sum_{f=1}^{n} a_{e,f}X_f \]

Where, \( Y_e \) represents the e-skill of \( e^{th} \) respondent, \( a_{e,f} \) represents the assessment of the \( f^{th} \) item by \( e^{th} \) respondent, \( X_f \) represents the \( f^{th} \) item and \( n \) is the number of items.

The Cronbach’s Alpha values for each of the four dimensions were found greater than 0.7, hence, the internal consistency and reliability of the e-skill scale is high. The Bartlett’s Test of Sphericity showed that non-zero correlations exist at the significance level of 1%. It indicates that a factor analysis is very useful with the present data. Kaiser-Meyer-Olkin measure of sampling adequacy value is close to 1 (i.e. 0.83), that indicates the adequacy of sample. The findings from Table 4 confirm the appropriateness of the sample for the multivariate analysis. To find out different levels of experts’ E-skills, a non-hierarchical cluster analysis based on k-means methodology was carried out in order to define the agricultural experts’ segments for E-skills. The framework of methodology is presented in figure 1.

RESULTS AND DISCUSSION

Profile of agricultural experts (Table 1) revealed that most of them (47.13%) belonged to the middle aged followed by young (27.59%) and old (25.29%). Most of them (62.07%) had less than 10 years working experience in KVKs. Majority of them (67.82%) had Doctorate of Philosophy (PhD.) degree followed by post-graduation (32.18%). Most of them (74.71%) were Subject Matter Specialist (SMS) followed by the Programme Coordinator (PC) (25.29%). More than half of the respondents (60.92%) had a wide range of experience i.e., 3 to 16 years while one fifth (20.69%) of the experts had more than 16 years of service. One-third (33.33%) of the total agricultural experts had undergone the trainings on ICTs.
Table 1. Personal profile of agricultural experts (n= 87). a

<table>
<thead>
<tr>
<th>Variables</th>
<th>Categories</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age</td>
<td>Young (&lt; 35 years)</td>
<td>27.59</td>
</tr>
<tr>
<td></td>
<td>Middle (36-50 years)</td>
<td>47.13</td>
</tr>
<tr>
<td></td>
<td>Old (&gt; 50 years)</td>
<td>25.29</td>
</tr>
<tr>
<td>Working experience (years)</td>
<td>&lt; 5 years</td>
<td>29.89</td>
</tr>
<tr>
<td></td>
<td>5 to 10 years</td>
<td>32.18</td>
</tr>
<tr>
<td></td>
<td>10 to 15 years</td>
<td>14.94</td>
</tr>
<tr>
<td></td>
<td>15 to 20 years</td>
<td>16.09</td>
</tr>
<tr>
<td></td>
<td>&gt; 20 years</td>
<td>6.90</td>
</tr>
<tr>
<td>Designation/Post held</td>
<td>Subject matter specialist</td>
<td>74.7</td>
</tr>
<tr>
<td></td>
<td>Programme coordinator</td>
<td>25.3</td>
</tr>
<tr>
<td>Educational qualification</td>
<td>Post graduation</td>
<td>32.2</td>
</tr>
<tr>
<td></td>
<td>PhD</td>
<td>67.82</td>
</tr>
<tr>
<td>Training on ICTs</td>
<td>Attended</td>
<td>66.7</td>
</tr>
<tr>
<td></td>
<td>No training</td>
<td>33.3</td>
</tr>
</tbody>
</table>

*a Source: Primary data.

E-skills Among the Agricultural Experts of KVKs

Table 2 depicts various E-skills possessed by agricultural experts of KVKs. Five main functions of E-skills, viz., internet browsing, e-mail functions, Microsoft (MS) Word, MS Power-Point and mobile use for sending text messages were frequently used by the expert. The weighted mean score of these E-skills were 81.15, 81.38, 80.92, 77.93 and 74.25, respectively. The other E-skills were MS Excel, radio talk, television talk, internet based mobile messaging, mobile phone use for sending voice message, teleconferencing, Interactive Multimedia Compact Disc (IMCD), video conferencing and video production in the order of expertise, respectively. The agricultural experts were found with poor E-skills in use of statistical analysis package, web based
Table 2. E-skills among agricultural experts (%) in use of ICTs (n= 87).a

<table>
<thead>
<tr>
<th>Expertise</th>
<th>Response</th>
<th>Weighted mean</th>
<th>Rank</th>
</tr>
</thead>
<tbody>
<tr>
<td>Internet browsing</td>
<td>Excellent 39.08</td>
<td>81.15</td>
<td>1</td>
</tr>
<tr>
<td>1. E-mail functions</td>
<td>Very good 36.78</td>
<td>40.23</td>
<td>2</td>
</tr>
<tr>
<td>2. MS Word</td>
<td>Good 16.09</td>
<td>13.79</td>
<td>3</td>
</tr>
<tr>
<td>3. MS Power Point</td>
<td>Fair 6.90</td>
<td>6.90</td>
<td>4</td>
</tr>
<tr>
<td>4. Mobile phone use for sending text message</td>
<td>Poor 1.15</td>
<td>1.15</td>
<td>5</td>
</tr>
<tr>
<td>5. MS Excel</td>
<td>Excellent 31.03</td>
<td>22.99</td>
<td>6</td>
</tr>
<tr>
<td>6. Radio talk</td>
<td>Very good 25.29</td>
<td>27.59</td>
<td>7</td>
</tr>
<tr>
<td>7. TV talk</td>
<td>Good 20.69</td>
<td>16.09</td>
<td>8</td>
</tr>
<tr>
<td>8. Internet based mobile messaging</td>
<td>Poor 18.39</td>
<td>12.64</td>
<td>9</td>
</tr>
<tr>
<td>9. Mobile use for sending voice message</td>
<td>Fair 26.44</td>
<td>29.73</td>
<td>10</td>
</tr>
<tr>
<td>10. Tele conferencing</td>
<td>Excellent 10.34</td>
<td>13.79</td>
<td>11</td>
</tr>
<tr>
<td>11. Interactive Multimedia Compact Disc (IMCD)</td>
<td>Very good 26.44</td>
<td>36.09</td>
<td>12</td>
</tr>
<tr>
<td>12. Video conferencing</td>
<td>Good 1.15</td>
<td>10.34</td>
<td>13</td>
</tr>
<tr>
<td>13. Video production</td>
<td>Fair 34.48</td>
<td>34.48</td>
<td>14</td>
</tr>
<tr>
<td>14. Statistical analysis packages</td>
<td>Poor 35.63</td>
<td>35.63</td>
<td>15</td>
</tr>
<tr>
<td>15. Web based decision support system</td>
<td>Good 1.15</td>
<td>10.34</td>
<td>16</td>
</tr>
<tr>
<td>16. GIS</td>
<td>Poor 35.63</td>
<td>35.63</td>
<td>17</td>
</tr>
</tbody>
</table>

a Source: Primary data.

decision support system and Geographical Information System (GIS). These E-skills are important for conducting various extension activities in KVKs with the help of ICT tools. For creating awareness on improved agricultural technologies, E-skills of mobile phone based message, radio talk, television talk are needed. For carrying out the daily activities in KVK, internet browsing, e-mail functions and MS word are the major skills required by SMSs/PCs. To undertake the research surveys, analyzing research results of the knowledge of statistical software, web based decision support system and Geographical Information System (GIS) is highly useful. Moreover, the policy of Indian Government is marching towards making India digital. Many ICT based agriculture initiatives have been started. Some of these are implemented through KVK such as KVK-net e-connectivity, mobile phone based farmers’ advisory services, virtual Krishi Vigyan Kendra (vKVK) etc. The capacity building of agricultural extension functionaries and scientists through training on ICT skills is necessary to win their trust in the system and ensure continuous updating on latest technologies (Kale et al., 2015c). This will improve the efficiency of agricultural experts for performing the extension activities efficiently.

Effect of Selected Personal Variables on E-skills of Agricultural Experts

The results of the step-wise regression presented in Table 3 shows that only $X_1$ (age) and $X_2$ (training acquired on ICT) had a significant effect on the E-skills of agricultural experts. The variables namely, $X_2$ (working experience), $X_3$ (designation)
Table 3. Effect of personal variables on E-skills of experts.

<table>
<thead>
<tr>
<th>Personal variables</th>
<th>Unstandardized coefficients</th>
<th>Standardized coefficients</th>
<th>t Value</th>
<th>Sig</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>B</td>
<td>Std error</td>
<td>Beta</td>
<td></td>
</tr>
<tr>
<td>1 Constant</td>
<td>71.214</td>
<td>5.311</td>
<td>13.408</td>
<td>0.000</td>
</tr>
<tr>
<td>Age</td>
<td>-0.560</td>
<td>0.126</td>
<td>-0.434</td>
<td>-4.440</td>
</tr>
<tr>
<td>Constant</td>
<td>70.707</td>
<td>4.635</td>
<td>15.254</td>
<td>0.000</td>
</tr>
<tr>
<td>Age</td>
<td>-0.633</td>
<td>0.111</td>
<td>-0.490</td>
<td>-5.704</td>
</tr>
<tr>
<td>training on ICT</td>
<td>10.505</td>
<td>1.998</td>
<td>0.452</td>
<td>5.258</td>
</tr>
</tbody>
</table>

Dependent variable: E-skills, $R^2 = 39$

Table 4. Reliability and goodness of fit of factors statistics

<table>
<thead>
<tr>
<th>Components</th>
<th>Eigen value</th>
<th>% Of variance</th>
<th>Cumulative %</th>
<th>Cronbach’s Alpha</th>
</tr>
</thead>
<tbody>
<tr>
<td>Elementary use of ICT</td>
<td>7.609</td>
<td>44.758</td>
<td>44.758</td>
<td>0.96</td>
</tr>
<tr>
<td>Analytical use of ICT</td>
<td>2.318</td>
<td>13.637</td>
<td>58.396</td>
<td>0.86</td>
</tr>
<tr>
<td>Use of mobile for dissemination of information</td>
<td>1.552</td>
<td>9.130</td>
<td>67.526</td>
<td>0.80</td>
</tr>
<tr>
<td>Use of ICT for mass communication</td>
<td>1.250</td>
<td>7.354</td>
<td>74.879</td>
<td>0.73</td>
</tr>
</tbody>
</table>

KMO and Bartlett’s Tests
Kaiser-Meyer-Olkin measure of sampling adequacy. 0.83
Bartlett’s test of sphericity
Approx Chi-Square 1.178E3
df 136
Sig 0.000

The young agricultural experts were more enthusiastic towards learning new tools of ICTs for technology transfer.

Principle Components of E-skills

The analysis of the E-skills of agricultural experts by PCA resulted in four principal components with an Eigen value greater than 1. The total variance explained by these factors was 74.88% (Table 4), which is considered as highly satisfactory (Hair et al., 2006). In order to get a meaningful interpretation of items and for factor mapping along the principal axis, the extracted principal component was rotated using orthogonal transformation by varimax. The results of factor rotation matrix by varimax are given in Table 5. The 17 items of the E-skills were converted into four principal components or factors. The
behaviour of individual items in relation to others within the same factor provides confirmation of content validity because the highest factor loading is central to the domains assessed by these factors (Francis et al., 2000).

The results (Table 5) revealed that the values of factor loadings ranged from 0.882 to 0.799 for factor 1 (F1). The items of E-skills of agricultural experts found in factor 1 shows proficiency in basic use of the ICT in the daily work named as elementary use of ICT. In factor 2 (F2), the factor loadings ranged from 0.855 to 0.678 and the items were related to the use of ICT for analysis purpose like statistical software, DSS, GIS, interactive multimedia, this is why it was interpreted as ‘Analytical use of ICT’. The factor loadings in factor 3 ranged from 0.796 to 0.382. The items in this factor related to the harnessing of mobile phones for information sharing between experts and farmers as well as among the experts via video and tele-conferencing, and text and voice messages. Therefore, it was named as ‘Use of mobile phone for dissemination of information’. Factor 4 (F4) was named as ‘Use of ICT for mass communication’ because the items related to the E-skills of mass communication like radio talk, video talk and video production were found with factor loadings ranging from 0.931 to 0.375.

**Levels of E-skills among the Agricultural Experts**

In order to identify the different levels of experts’ E-skills, grouping of the 87 experts was done by using cluster analysis. Cluster

<table>
<thead>
<tr>
<th>Items</th>
<th>Factors</th>
</tr>
</thead>
<tbody>
<tr>
<td>Expertise in internet browsing</td>
<td>0.876</td>
</tr>
<tr>
<td>Expertise in e-mail functions</td>
<td>0.882</td>
</tr>
<tr>
<td>Expertise in word processing function</td>
<td>0.872</td>
</tr>
<tr>
<td>Expertise in excel or spreadsheet function</td>
<td>0.799</td>
</tr>
<tr>
<td>Expertise in power point presentation function</td>
<td>0.843</td>
</tr>
<tr>
<td>Expertise in statistical analysis software</td>
<td>0.707</td>
</tr>
<tr>
<td>Expertise in Interactive Multimedia Compact Disc (IMCD) preparation and use</td>
<td>0.678</td>
</tr>
<tr>
<td>Expertise in Geographical Information System use (GIS)</td>
<td>0.855</td>
</tr>
<tr>
<td>Expertise in web based Decision Support System use (DSS)</td>
<td>0.750</td>
</tr>
<tr>
<td>Expertise in video conferencing</td>
<td>0.788</td>
</tr>
<tr>
<td>Expertise in tele-conferencing</td>
<td>0.796</td>
</tr>
<tr>
<td>Expertise in internet based mobile messaging functions</td>
<td>0.575</td>
</tr>
<tr>
<td>Expertise in mobile use for sending text message</td>
<td>0.382</td>
</tr>
<tr>
<td>Expertise in mobile use for sending voice message</td>
<td>0.557</td>
</tr>
<tr>
<td>Expertise in radio talk</td>
<td>0.931</td>
</tr>
<tr>
<td>Expertise in TV talk</td>
<td>0.907</td>
</tr>
<tr>
<td>Expertise in video production for extension programmes and trainings</td>
<td>0.375</td>
</tr>
</tbody>
</table>

Extraction method: Principal Component Analysis
Rotation method: Varimax with Kaiser Normalization

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Table 5. Factor rotation matrix by Varimax.
analysis aimed to find the homogeneous groups and to maximize the difference between groups. A non-hierarchical cluster analysis based on K means technique was performed and four segments or groups of experts based on level of E-skills were identified. In order to interpret the level of experts’ E-skills, the matrix of E-skills mean of scores in each cluster and factors was calculated and presented in Table 6.

Figure 2 represents the schematic representation of factors and levels of E-skills of agricultural experts. The E-skills are governed by 4 factors namely, elementary use of ICT, analytical use of ICT, use of mobile phone for dissemination of information, and the use of ICT for mass communication. The levels of E-skills were Tactical E-skills, Informative E-skills, Formal E-skills, and Communicative E-skills and ranked 1 to 4, respectively, where 1 represents the highest level of E-skills and 4 represents the lowest. This framework of E-skill categories was found in line with the E-skills categorization given by Youssef et al. (2013) and Deursen and van Dijk (2010).

The levels of experts’ e-skills of the four clusters (segments) are illustrated in Table 6 and profile of the segments (Table 7) can be interpreted as:

**Segment 1 (Tactical E-skills)**

Segment 1 is characterized by tactical E-skills which consist of 26.43% of the total agricultural experts who possessed high E-skills and ranked first. The expert in this profile possessed high level of proficiency as compared to others in all factors of E-skills. A majority of them were in the middle and young age category (60.87% and 30.43%), respectively. Segment 1 is particularly notable as most of them had acquired training related to ICTs (60.87%). Training related to ICTs is essential to achieve the higher level of E-skills in KVK. The tactical e-skill is corresponding to strategic skill identified by Van Deursen and van

| Table 6. Interpretation of level of E-skills clusters. 
<table>
<thead>
<tr>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>E-skills</strong></td>
</tr>
<tr>
<td><strong>Elementary use of ICT (F1)</strong></td>
</tr>
<tr>
<td>Formal E-skills</td>
</tr>
<tr>
<td>Tactical E-skills</td>
</tr>
<tr>
<td>Informative E-skills</td>
</tr>
<tr>
<td>Communicative E-skills</td>
</tr>
</tbody>
</table>

*Note: The mean is in bold value when it is significantly higher in the considered cluster.*

**Figure 2.** Schematic representation of factors determining the levels of E-skills.
Table 7. Profile of the segments by agricultural experts’ E-skills

<table>
<thead>
<tr>
<th>Variables</th>
<th>Categories</th>
<th>Segment-1 (Tactical E-skills)</th>
<th>Segment-2 (Informative E-skills)</th>
<th>Segment-3 (Formal E-skills)</th>
<th>Segment-4 (Communicative E-skills)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>f</td>
<td>%</td>
<td>f</td>
<td>%</td>
</tr>
<tr>
<td>Age</td>
<td>Young (&lt; 35 years)</td>
<td>07</td>
<td>30.43</td>
<td>06</td>
<td>28.57</td>
</tr>
<tr>
<td></td>
<td>Middle (36-50 years)</td>
<td>14</td>
<td>60.87</td>
<td>11</td>
<td>52.38</td>
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<tr>
<td></td>
<td>Old (&gt;50 years)</td>
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<td>04</td>
<td>19.05</td>
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<td>Working experience in KVK</td>
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<td>06</td>
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<td>07</td>
<td>33.33</td>
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<tr>
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<td>06</td>
<td>28.57</td>
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<td>11-15 years</td>
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<td>05</td>
<td>23.81</td>
</tr>
<tr>
<td></td>
<td>15-20 years</td>
<td>06</td>
<td>26.09</td>
<td>02</td>
<td>09.52</td>
</tr>
<tr>
<td></td>
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<td>01</td>
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<td>19.05</td>
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<tr>
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<td>05</td>
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<td>08</td>
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<tr>
<td></td>
<td>No</td>
<td>09</td>
<td>39.13</td>
<td>13</td>
<td>61.90</td>
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<tr>
<td>Total</td>
<td></td>
<td>23</td>
<td>100</td>
<td>21</td>
<td>100</td>
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</table>

Dijk (2010) which is highly important for personal and professional development.

**Segment 2 (Informative E-skills)**

Segment 2 includes 24.13% of the respondents. Experts in this segment possessed informative E-skills and ranked second based on their E-skills. Most of them (52.38%) were in the middle age category. These experts had good expertise in use of ICT for the various components like elementary use of ICT, use of mobile for dissemination of information and use of ICT for mass communication, but they were not very proficient in use of ICT based analytical tools like statistical tools, GPS, DSS and multimedia.

**Segment 3 (Formal E-skills)**

Segment 3 comprises 26.43% of KVKs experts who were characterized by formal E-skills and acquired proficiency in elementary use of ICT and mobile communication technologies. These respondents were ranked third in the level of E-skills. They possessed skills typically in internet browsing, e-mail, word processing, spreadsheet and power point presentation functions along with mobile phone based communication skills like video and tele-conferencing, internet and mobile based text, and voice messaging. Generally, experts from segment 3 did not use specialized software. They especially had the basic skills to operate computers and mobiles. Most of them (47.83%) and (43.48%) were in the middle to young age category respectively. Very few of them acquired training on ICTs (17.39%). Lack of training may be the reason for low level of E-skills in this segment. Specialized training courses on ICT should be organized to improve the scientists’ proficiency in ICT (Kale et al., 2015c and Tayade et al., 2011).
Segment 4 (Communicative E-skills)

This cluster (segment-4) includes 22.98% of experts who were characterized by the least E-skill. The experts of this group possessed skills only in use of ICT for mass communication i.e. delivering TV talk, radio talk and video production. They were having low skills in other areas of ICT use. Most of them (70%) were found in the old age category. Older people are more oriented towards the traditional techniques that may be the reason for lower E-skills. Very few of them acquired training on ICTs (15%). Lack of training on ICT and the higher age of experts were the major factors responsible for lower level of E-skills in other areas than communication e-skill.

CONCLUSIONS

The high level of E-skills possessed by the agricultural experts were identified in internet browsing, e-mailing, Micro-Soft (MS) Word, MS Power-Point and mobile use for sending text messages. The experts were constrained with advanced E-skills for use of ICTs for diffusion of agriculture technology. The proficiency in elementary use of ICT, analytical use of ICT, use of mobile phone and use of ICT for mass communication were the major factors governing the E-skills of agricultural experts. Tactical E-skills, informative E-skills, formal E-skills and communicative E-skills were identified as important levels of E-skills in order of advanced to basic. The agricultural experts’ training on ICTs had a positive and significant effect while their age had a negative effect on E-skills of the experts. Hence, it is recommended that the young agricultural experts can be trained on ICTs for improving their E-skills towards the tactical level of E-skills for higher efficiency in technology diffusion. Hence, the training programs on ICT should be organized based on the level of E-skills and age. Young experts should impart more advanced tactical E-skills, whereas step wise training programs for middle to older experts should be designed to impart E-skills from communicative levels to tactical levels of E-skills. This study shows that young agricultural experts need to be promoted as they can produce better results with use of ICT in dissemination of agricultural technologies.

REFERENCES

E-Skills among Agricultural Experts

تعیین عوامل و سطوح مهارت های الکترونیکی در میان کارشناسان کشاورزی در هند

Vigyan Kendras

چکیده

فناوری اطلاعات و ارتباطات (ICT) یکی از نیروهای محرک در حال ظهور برای انتشار دانش کشاورزی است. کارکنان ماهر می‌توانند از این فرصت‌ها برای رواج فناوری کشاورزی به جامعه کشاورزی استفاده کنند. بنابراین مطالعه حائز اهمیت است که به‌منظور تعیین عوامل و سطوح مهارت الکترونیکی کارشناسان کشاورزی در هند را انجام دهند. این مطالعه در کشورهای هند، کارشناسان کشاورزی 78 کارشناس کشاورزی را در مراکز علمی ایالات های Gujarat و Rajasthan در هند با استفاده از یک پرسشنامه الکترونیکی در مقیاس لیکرت 5 پی‌بندی کرده‌اند. مهارت الکترونیکی در مقیاس لیکرت 5ینقطه اندازه‌گیری شد. سطح مهارت های الکترونیکی میان کارشناسان کشاورزی از طریق استفاده آنها از اینترنت، دریافت ایمیلی، سخت و نرم افزار، قدرت نقطه MS، و استفاده از موبایل برای شناسایی شد. کارشناسان کشاورزی اموزش دیده رابطه منفی با مهارت الکترونیکی داشتند. مهارت در استفاده از اینترنت، استفاده از تلفن همراه برای برقراری ارتباط و استفاده از فناوری اطلاعات و ارتباطات برای ارتباط جمعی از عوامل عمده‌ی کارشناسان کشاورزی می‌باشد. واریانس کل توضیح داده شده، درصد 74.88 درصد بود. مهارت الکترونیکی کارشناسان کشاورزی های آموزش‌دهنده الکترونیکی، مهارت الکترونیکی و ارتباط الکترونیکی به معنای مهارت الکترونیکی کارشناسان کشاورزی بوده‌اند. این رو این مطالعه، بیشتر از طریق آموزش برای بهبود مهارت الکترونیکی کارشناسان کشاورزی به سمت سطوح تاکتیکی مهارت الکترونیکی می‌کند.