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E–Learning in Extension Systems: Empirical Study in Agricultural Extension in India

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ABSTRACT

E-learning is deciphered as an effective tool to disseminate knowledge and information and has become the boom to the end users. Indian agriculture is witnessing many changes and to meet the challenges, extension system of the country needs to look for alternate ways of learning and training opportunities. In the recent past, Information and Communication Technologies (ICTs) have been seen as potential tools to enhance the system efficiency and meeting the developmental goals. India has one of largest extension system where in more than nine million extension workers functioning under public sector. ICT's can help in enabling extension workers to gather, store, retrieve, adapt, localize and disseminate a broad range of information needed by farmers, thus transforming them from extension workers to knowledge workers. Rice being the staple crop of India and grown widely requires more attention in order to generate learning opportunities in the public sector extension. Traditional knowledge flow mechanisms may not cater to the existing and emerging needs of the stakeholders. A continuous 24 X 7 training support must be made available based on the requirements of the need based stakeholders. While introducing the e-learning strategies in agriculture, there are few issues to be considered. Such issues include e-readiness of public sector extension, information literacy behavior, etc., The study is mainly based on the results on e-readiness assessment among the extension personnel in rice growing regions of Andhra Pradesh, a South Indian Province.

Over the past decade, there has been a resurgence of international interest in distance education and distance learning as potentially useful strategy for addressing human development issues. This resurgence has been rooted in part in the evolution of new information and communications technologies, and in part in the improvement of pedagogical and administrative models for facilitating learning at a distance. More recently, harnessing e-learning strategies are gaining significance.

ICTs can help in enabling extension workers to gather, store, retrieve, adapt, localise and disseminate a broad range of information needed by farmers, thus transforming them from extension workers into knowledge workers. The emergence of such knowledge workers will result in the realisation of the much talked about bottom-up, demand driven technology generation, assessment, refinement and transfer (Shaik Meera et.al. 2004). A large range of media is available for distance education in agriculture that needs to be harnessed. But without more representative content, there is less incentive for farmers to harness the ICTs for agricultural prosperity. Hence the content development for Open and Distance Learning (ODL) is essential.

In Extension, distance education may possibly be carried out in one of the following three ways: through a single medium - this was more commonly used in the past where the learning message was prepared in a single medium and the learner learnt themselves through that medium for example- during the green revolution period, radio was used as a single medium to reach out to the farming community in majority of the villages; through a master medium with other reinforcing medium - where

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all messages are delivered through one medium, with another medium used to reinforce complex or difficult messages delivered by the master medium; for example the rural radio forums which were popular in latin American countries have used radio programmes to reach out to the farmers along with group meetings and discussions on the radio messages were held for reinforcing the message. Through multi-media - where two or more media are used simultaneously to communicate the learning messages; the most recent example of rural extension campaigns that used a cafeteria of media is that of Polio eradication / sarva siksha abhiyaan.

Agriculture as a sector and rice as a crop, the magnitude of the content support much more complicated because of location specificity of the agricultural (rice) technologies. The task of location specific knowledge collection and application get further complicated because of wide spread and isolated nature of various knowledge generators and users. Traditional knowledge flow mechanisms may not cater to the needs of bringing in a common platform for all these players. India has the second largest number of extension workers in the world (110,000), of which majority are working in the rice regions. Their job role is under transformation, farmers beginning to set extension priorities at the district and block levels. Providing continuous knowledge support to this number of extension workers requires a 24X7 support service, possible only through e-learning strategies in agriculture.

In this backdrop, the present research on E-readiness and Information Literacy among Rice (extension) workers has conducted to assess the feasibility of e-learning strategies for agricultural development in general and rice sector in particular.

METHODOLOGY

The study was conducted during 2007-08, in Andhra Pradesh. Information was collected from 100 extension officials and 18 rice scientists from DRR, Warangal and Marteru working in the rice regions of Andhra Pradesh. The sample was selected based on Purposive Sampling as Andhra Pradesh has shown good results in e-governance initiatives and considering that the PI of the project has good perception on e-readiness. In order to assess the e-readiness factors of the State Agricultural Universities the sampling was done. A structured questionnaire was used to collect the data on socio-economic factors, e-readiness, information literacy and potential Digital Rice Knowledge Dissemination Systems (RKDS).

A comprehensive list of topics was prepared on which ODL modules could be developed. Perception about the information needs and appropriateness of different modules were collected. The differential perception about the appropriateness of the topics among the scientific community and the extension officials was worked out. Both quantitative and qualitative data has been- collected. The data thus collected has been analyzed using Statistical Package for social sciences. The statistical tools employed are descriptive statistics, coefficient of correlation, regression analysis and t' test.

RESULTS AND DISCUSSIONS

A. Profile of respondents

Among the extension workers responded (Table 1), majority are working as Agricultural officers (43%) in state department of agriculture. Rest of the respondents includes Assistant Directors of Agriculture and Joint Directors (21%) and NGOs /private sector extension workers (26%) and AEOs (10%). This is also reflecting the grass root situation of the extension system existing in the country. It is observed (Table 2) that majority of the respondents belonged to young and medium age category (43% and 28% respectively). Respondents in these two categories have experienced the tremendous impacts made by ICTs during their post graduation or in the early phase of their career. Their acquaintance and conviction about the ICTs role in day to day life will have far reaching consequences in the future extension systems. Further about 56 per cent are having the M. Sc (Ag.) as the educational qualifications (Table 3). It is also learnt that these post graduate extension officers have been exposed to basics of computers and ICTs during their studies.

Table 1. Distribution of Respondents based on Designation (Extension)

S.No.	Category	Frequency (%)
1.	AEO	10
2.	MAO/AO	43
3.	ADA/JD	21
4.	NGO/Pvt.	26
5.	Others	0
	Total	**100**

Table 2. Distribution of Respondents based on Age

S.No.	Category	Frequency (%)
1.	26-35 (< 35)	43
2.	36-45	28
3.	46-56 (> 56)	29
	Total	**100**

Table 3. Distribution of Respondents based on Educational Qualification

S.No.	Category	Frequency (%)
1.	B.Sc	6
2.	Ag . B.Sc	30
3.	Ag. M.Sc	56
4.	Ph.D.	8
	Total	**100**

B. Distribution of respondents based on major activity

The major activity of respondents (Table 4) is extension (74%),followed by the combination of extension, research and training (26%). Even though the responses indicate that extension is the prime focus of their job chart, it is observed that majority of them completely engrossed with the administrative and other works not related to the extension advisory services. This was revealed during the non participant observation done by the investigators during the interviews. In these situations, not all the extension officers can move away from the offices for regular training programmes to update them.

Table 4. Distribution of respondents based on major thrust activity

S.No.	Category	Frequency (%)
1.	Extension	74
2.	Extension, Research & Training	26
	Total	**100**

C. Distribution of Respondents based on Experience

Respondents were having varied experience (Table 5) in the rice regions ranging from less than five years (33%) to more than twenty years (31%). Majority of the extension workers (72%) have difficulty in updating rice knowledge while the remaining 28% have observed perceived utility which states that they don't find any difficulty in updating as they assume to know the process completely (Table 6). It is quite vident from the literature that many scholars and observers of rural development commented on the frequent manifestations of the unsatisfactory extension performance. Even T&V system was considered as an innovative approach to support some of the public sector extension approaches in 70's and 80's. After the World Bank funding ceased, there is a vacuum, particularly in regular information updating of extension officers. The conventional information sources have been inadequate to provide the needed information and training support to the extension workers (Table 7). Majority of the respondents (45%) are willing to spend 30 minutes - one hr per week for updating their knowledge.

Table 5. Distribution of respondents based on experience and knowledge updation.

S.No.	Category	Frequency (%)
1.	< 5 years	33
2.	6-10	10
3.	11-15	26
4.	16-20	0
5.	> 20	31
	Total	**100**

Learning Knowledge Acquisition

Perception of the extension officers about the difficulty in updating their knowledge is an issue faced by training organizations.

Table 6. Distribution of Respondents based on Difficulty in updating

S.No.	Category	Frequency (%)
1.	No	28
2.	Yes	72
	Total	**100**

Even though, training organizations feel that there is a great need to update the knowledge levels of extension workers, until the time it doesn't become a felt need, the learning would not be effective. Hence, the respondents were asked to respond to this question.

The results revealed that, majority of them felt that they were facing difficulties in updating their knowledge because of several reasons like institutional constraints, lack of training opportunities etc., While the table 6 deals with the perceived difficulties in updating the knowledge, table 7 given below deals with what amount of time they would like to contribute to update their knowledge given an opportunity for online/ offline learning.

Table 7. Distribution of respondents based on updating time

S.No.	Category	Frequency (%)
1.	< 30 min/week	0
2.	30 min – 1 hr/week	45
3.	1-2 hrs/week	12
4.	Flexibility to Use ICTs	43
	Total	**100**

In majority of extension systems, in the absence of regular training and capacity building exercises, the information disequilibrium between the extension officers and the farmers will not contribute to the favourable impacts. One way of providing the regular information and training support 24 x 7 at their place of work and at their convenience is by adopting e-learning strategies. In the existing extension systems, the extension officers' willingness to spend time on regular basis will influence their efficiency and effectiveness. Hence it was decided to determine the extent of time that extension officers would like to contribute for updating their knowledge. About 43% responded that they would be willing to opt for need based (flexible) time schedules for updating (Table 7). The proposed e-learning strategies need to take into consideration these parameters for customizing the content and courses.

D. ICT Skills and Usage

Table 8. Distribution of Respondents based on ICT Skills

S.No.	Category	Frequency (%)
1.	Less	25
2.	Moderate	38
3.	High	37
	Total	**100**

An analysis of the distribution of respondents based on ICT skills/ revealed (Table 8) moderate to high degree (38% and 37%) of ICT skills among the rice extension workers. The data appeared to have skewed towards high levels of ICT ability because of use of mobile phones by majority of the respondents. Keeping in view the ease in access and penetration of mobile phones in the rural India, the e-learning efforts will pay way in developing m-learning. The challenge now lies in developing the reusable learning objects suitable for the e-learning and m-learning.

The e-learning strategies should aim at existing level and frequency of use of ICT tools amongst the extension workers. Respondents were asked as how frequently they would make us of different tools, so that mode of delivery of e-learning courses could be decided. An analysis of present ICT usage pattern revealed that digital content may be disseminated in a weekly format (35%) for online courses and twice in a week (41 %) for offline courses. Other than ICTs, the information sources for the extension workers are news paper, TV, agricultural magazines and private sources. The figures in the parenthesis denote the percentage of respondents falling under a particular frequency category (modal classes) (Table 9). Over all it is observed that the extension workers are having mass media exposure (73%). Distribution of Respondents based on Computer Training, Web browsing and Mass media Exposure also revealed that more than 50% of the extension officers have had good exposure towards ICTs usage.

Table 9. Distribution of Respondents based on Frequency of ICT usage Respondents (%)

Frequency	Mobile	PC	Internet	VC	VCD/DVD
Never	0	10	14	83	0
Once a month	0	17	17	17	46
Once a Fortnight	0	4	8	0	28
Once a week	0	2	35	0	0
> Two times a week	17	41	26	0	26
Daily	83	26	0	0	0

Table 10. Distribution of respondents based on frequency of mass media use (Extension)

Frequency of use	News paper	Radio General	Radio Farm broadcast	Magazines	Television	Fellow Workers	Private Source	Farmers
Never	0	100	85	17	0	0	0	0
Monthly once	0	0	15	16	17	27	55	47
Fortnightly Once	0	0	0	67	0	30	41	43
Weekly once	0	0	0	0	10	39	0	0
> two times a week	17	0	0	0	19	4	4	4
Daily	83	0	0	0	54	0	0	6
Total	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**

An elaborated tabular illustration of the factor-frequency of use of ICT Tools in table 10 is shown in table 11, where in all the available mass media and their frequency of use is explained. Similarly the correlation factor for media exposure is given in table 14 below.

Table 11. Distribution of Respondents based on Mass media Exposure (Extension)

S.No.	Category	Frequency (%)
1.	Low	10
2.	Medium	73
3.	High	17
	Total	**100**

E. Feasibility of potential Digital Rice Knowledge Delivery Systems

For using the e-learning strategies, various potential Digital Rice Knowledge Delivery Systems (RKDS) are also identified. This will help choosing the effective channel for knowledge delivery for future extension systems. Among these RKDS, online courses with field exposure - popularly known as blended learning (88%), online synchronous courses (73%) and online asynchronous courses (68%) are identified to have feasibility for launching e- learning courses. There is great need to bundle the e- learning courses into VCDs/DVDs so that, these courses can be delivered through these (offline) channels also.

This is inline with the findings where it was found that 90 per cent of the respondents felt that VCD /DVD could be a viable means of delivering the e-learning courses (Table 10). The feasibility frequency was calculated based on the percentage of respondents opining that that particular mode could be adopted for the delivery. Multiple responses were allowed in responding to various modes of delivery systems. As the Digital Knowledge Delivery Systems vary subject to the contexts, these results will help designing the future extension system. The feasibility frequencies for each medium and mode can be assessed in different extension contexts. Keeping the focus of the paper, the inferences for these contexts are not explained here.

E-readiness perception of extension workers revealed that 54% have moderate and 30 per cent have high level of e- readiness. (Table 11)

Table 12. Potential Rice Knowledge Delivery Systems

Sl. No.	Media	Mode	Feasibility Feasibility	Mode	Feasibility Frequency	Mode	Frequency Frequency
1.	Mobile phone	a. SMS Based Information exchange	37	b. Call centre responses	8	c. Multi media exchanges	0
2.	Computer (stand alone)	a.Interactive CD- ROM	71	b. Video Files	2	c. Offline Courses	33

3.	Computer (Internet connected)	a. Online Synchronous Courses	73	b. Online Asynch-ronous Courses	68	c. Online problem Solving using e-mail	32
		d. Online Support Systems	2	e. Blogs/ You tube	0	f. Websites	67
		g. Online Courses along with Field Exposure	88	h. Online individual chunks of information	0	i. Discussion Groups	28
4.	Video a. Conference Faculty	One way information flow	0	b. Two way information Flow	67	c. Multi-actor sharing	41
5.	VCD /DVD Players	CD/DVD shows	90	-	-		-

Table 13. Distribution of Respondents based in E-readiness Perception

S.No.	Category	Frequency (%)
1.	Low	16
2.	Medium	54
3.	High	30
	Total	**100**

As the e-readiness is important issue when it comes to application of e-learning strategies, the perception of the respondents was assessed using 16 statements. The total score was raging between 16 to 64. Based on the mean and standard deviations respondents have been categorized into low, medium and high levels of e-readiness.

To assess the frequency of use of traditional mass media (other than modern ICTs), eight different types of mass media sources have been selected for getting the responses from the extension workers. Based on the frequency of use of these media, the respondents have been classified into low, medium and high mass media

Table 14: Correlation Matrix

	Experience	Time for updation	ICT Ability	Frequency of use (average of all the ICT tools)	Comp Trg	Media Exposure	Rice Knowledge	ERP Delivery System
experience	1							
Time	-0.5166**	1						
ICT Ability Total	-0.8372**	0.1523	1					
Frequency of use	-0.7026**	-0.0633	0.9318**	1				
Comp Trg	-0.9379**	0.2854**	0.9493**	0.8921**	1			

Media Exposure	-0.8831**	0.4494**	0.8264**	0.7264**	0.8803**	1		
Rice Knowledge Delivery Systems	-0.9070**	0.4001**	0.8272**	0.7825**	0.9053**	07952**	1	
ERP	-0.7653**	0.1167	0.8135**	0.8938**	0.8826**	0.7027**	0.8517**	1

exposure groups. The results are given in tables 10 and 11.

Individual score of all the factors studied, have been correlated to get the degree of association between these factors. Computer training received by the respondents was studied by giving the score of 1 for the previous training exposure and 0 for the non exposure. For rest of the factors, higher score is taken as an indication for higher levels of ICT usage, higher e-readiness perception (ERP) etc,

From table 12, it may be seen that factors such as ICT ability (r=0.8135**), frequency of use of ICTs (r=0.8938**), experience (r= -0.7653**), mass media exposure (r=0.7027**) and several other socio- economic factors are having significant correlation at 1% level of significance. For pilot testing the e- learning strategies in extension systems, we need to focus on the extension officials having these factors/attributes.

Information literacy among the rice workers

People can be information literate in the absence of ICT, but the volume and variable quality of digital information, and its role in knowledge societies, has highlighted the need for everyone to achieve Information Literacy (IL) skills. A satisfactory level for any particular context will change over time. At any time, a new situation may require a new level of information literacy capacity.

Table 15: Information Literacy (IL)

S.No.	IL Indicator	%
1.	Recognize information needs	47
2.	Locate and evaluate information	33
3.	Store and retrieve information	22
4.	Make effective use of information	36
5.	Apply information to create and communicate	2 3
	Average Score	**32.2**

Adapted from LAMP Household Survey; http://www.uis.unesco.org/

All the respondents were assessed regarding the information literacy by posing two questions related to the IL indicator. Self assessment and self perception were quantified by giving 1 mark for the both the 'yes' answers. For individual respondent, the score range between 0 to l. Information Literacy (IL) Assessment among the rice workers revealed that recognizing information needs (47%), ability to locate and evaluate information (33%), ability to store and retrieve information (22%), ability to make effective use of information in a customized way (36%) and ability to apply information to create and communicate knowledge (23%) found to be at satisfactory levels. Of all the indicators, Store and retrieve information (22%) and apply information to create and communicate knowledge (23%) comparatively less satisfactory. There is scope for making the system readiness by mapping and focusing on the regions where IL indicators are weak in toto. There is a need for capacity building activities to promote various components of IL and e-readiness among the extension officers. Thus the pre-requisites for launching the e-learning strategies in the rice regions of Andhra Pradesh have been found to be favorable.

CONCLUSION

In the backdrop of tremendous opportunities provided by technology mediated ODL tools (e-learning) to revolutionalize the agricultural extension and trainings, convergence of conventional extension training methods and ODL. This necessitates developing e-learning strategies for extension systems. This work has focused on the e-readiness and other parameters of existing extension systems. It is expected that the methodology developed in the study can be used to develop strategies for application of E-Learning in Existing Extension Systems.

The findings revealed that the conventional information sources have been inadequate to provide the

needed information and training support to the extension workers in the country. On the other hand, an analysis of the distribution of respondents based on ICT skills/ revealed moderate to high degree of ICT skills among the rice extension workers.

Since majority of the respondents are willing to spend 30 minutes -1hr per week for updating their knowledge, there is a possibility of introducing the e-learning strategies in extension systems. In the absence of regular training and capacity building exercises, the information disequilibrium between the extension officers and the farmers will not contribute to the favourable impacts. The study empirically proves that one way of providing the regular information and training support 24X7 at their place of work and at their convenience is by adopting e-learning strategies.

For using the e-learning strategies, various potential Digital Rice Knowledge Delivery Systems (RKDS) are also identified which may be considered by the training organizations. This will help choosing the effective channel for knowledge delivery for future extension systems. Among these RKDS, blended learning, online synchronous courses and online asynchronous courses are identified to have feasibility for launching e-learning courses.

There is a need for capacity building activities to promote pre-requisites for launching the e-learning strategies in the rice regions of Andhra Pradesh that will have far reaching consequences in the extension systems of the country in general and Andhra Pradesh in particular.

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