

## **E-Learning Needs Assessment in Agriculture Sector of Pakistan**

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### **ABSTRACT**

*Compared to other business and management fields, e-learning in agriculture related fields is still in the early phases of adoption. Distance education and digital learning role in agriculture extension services is a viable mechanism for the upliftment of the standard of education and in the dissemination of advanced and adequate teaching. In this way CABI has conducted digital learning needs assessment survey in Pakistan.*

*E-Learning is dramatically improving how agricultural education is done. It is allowing greater access to more students and farmers, more efficiently, with better information. The evaluation results of the first international e-learning projects in agriculture show that much good can be done toward ensuring food security in the world if developed countries assist developing countries to implement e-learning methods. Under each major component, specific and relevant training needs questions were asked to the respondents and the collected information was systematically incorporated into an interview. Respondents from all the provinces were asked these questions to get better and diversified information.*

*This program is aimed at spreading the use of Digital Learning amongst the college/university level students in order to bring about a technology revolution and bridge the digital divide. Unfortunately, this approach is not very popular in Agriculture sector. The main reason is the majority of the farmers are illiterate and have limited access to ICT, they are familiar with messages and voice calls but the advance web-based education system is beyond their access right now. Simultaneously the Agri. Extension department, representative of more than 1000 generic, national & multinational input supply companies have extensive network at gross root level especially in rural areas where they are providing the timely and spot on solutions of their problems which is quite enough for farmers. However, the stakeholders in agriculture sector e.g. researchers, students, representative of the input supply companies, input suppliers and the officials from academia consciously needs to update their knowledge and skills to have better understanding of the crop health issues, innovative technologies in agriculture and to acquire skills needed to boost their career growth. In this way public and private sector institutions, Universities, trainings institutions, NGO's are offering on and off campus training programme. These courses are advertised through electronic & print media, pamphlets and nominating agency of agriculture department. However, only few universities in Pakistan except the Digital Learning & Skills Enrichment Initiative (DLSEI) are offering digital learning courses on agriculture.*

**Key words:** *E-learning; Digital learning; Assessment; Extension services*

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### **Specific Objectives of the Study**

- Assessment of farmers of different categories (unskilled, semi-skilled and skilled workers, managers, tenants and labourers) the skills and knowledge necessary for the exercise of their profession.
- To identify skills gap in extension service providers and gap between technical developments affecting agricultural production and their use in practice.
- To find out in-service training needs.
- To understand barriers which prevent recruitment, training and retention of people into the critical roles, including women, young people and disabled people.

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- Assessment of improvement of rural life generally and the promotion of greater satisfaction in agricultural work through trainings.
  - To understand the current set of learning service providers and the type of training they offer
  - To understand e-learning enabling environment.
  - Design appropriate methodology for getting genuine need assessment in terms of skills and career gaps
  - Conduct survey with respondents from all segments of Agriculture respondents particularly from Agro Input companies, Agro dealers, Public sector extension services, private sector extension services, Academia, Public clients, farmers and vocational training authorities.
  - Present finding and meaningful way for design and commercialization of e-learning product.
  - Improvement of incomes, standards of living, employment opportunities, working conditions and prospects of advancement in agriculture as a contribution towards remedying the lack of balance between agriculture and other occupations in these respects.
  - Achieving a proper balance in employment between agriculture and other branches of economic activity.

### Introduction

E-Learning can benefit every agricultural community around the world, from research scientists in universities to the poor subsistence farmers of developing countries. It can benefit persons of all ages, all locations, and bridge the gaps created by mountains, deserts, oceans, wars, and political boundaries. E-Learning in agriculture can assemble resources and knowledge from distant places that may otherwise be unobtainable. It can connect farmers with far away researchers and experts. It can also dramatically increase the numbers of farmers who can be reached by single training programs. Despite its potential omnipresence, there is a significant rift between high quality and low quality agricultural e-learning programs. Most e-learning programs in agriculture currently, being undertaken in the world are in the pioneering phase. These efforts are attempting to use low risk, low cost e-learning technologies. Services tend to be free but studies, pilot projects, and other initiatives are supported by grants [1].

#### **Status of ICT and Use of Digital Learning in Pakistan**

Many organizations and institutions are using e-learning because it can be as effective as traditional training at a lower cost. Information and communication technologies (ICTs) are important additions in modern technology. ICTs include internet, television, radio, mobile, networks, etc. which play an important role in various fields, such as health, education, agriculture and entertainment. Training is one of the most useful tools in business and industry to bring the best for the employees. It is designed to help the employee familiarized with the work, developed the pride. Maintained a high standard of services, and prepared for the advancement of the work with greater responsibilities. At the same time, the challenge in the training would boost the morale, enthusiasm, loyalty and interest in the work of the employees [2].

Pakistan's education Vision-2025 aims at significant expansion in education coverage, as well improvements in the quality of education. People are positively adapting to get degrees through online learning. In Pakistan, e-Learning is promoting but with lots of issues and challenges. The government is trying to resolve these issues. There are many public and private institutions providing e-Learning, wider spread is Virtual, COMSATS University. Virtual Campus and Virtual University of Pakistan (VUP) both are providing education through digital learning techniques. The virtual university is using ICT as multimedia/graphic software's, online teacher or trainer, video conferencing and cellular phones. However, as developing country there are some issues in e-learning especially in agriculture sector, lake of computer awareness, non-availability or low broadband speed, high cost of internet access, concept of less worth of degree/short course through e-Learning, few content materials, hard to access digital libraries and load shedding of electricity.

Some of the digitized trends in the educational sector of Pakistan are as follows:

- Most of the private schools and universities in Pakistan are making their classrooms digital by introducing interactive whiteboards, touch screens, computers, and projectors.
- The students are encouraged to go through internet facilities and avail required detailed knowledge of topics. Different educational apps are also introduced in smart gadgets that help students to understand and get knowledge more easily.

- The concept of getting knowledge using e-books is becoming very popular nowadays.
- Video-based learning making education engaging, entertaining and exploring.
- Many universities are offering facilities for online courses and diplomas e.g. Pakistan Institute of management, Virtual University of Pakistan etc.
- Different educational apps are also introduced in smart gadgets that help students to understand and get knowledge more easily. Scribd, Google reads, plantwise app, Evernote are some examples of such apps.
- Some of the private institutes are providing Wi-Fi facilities in all of their departments.
- In support of the government's Vision 2025, the Jazz Foundation was set to use innovation in imparting education to 75 schools in the federal capital [3].
- Prime Minister's Youth Program was a special initiative launched by the Government of Pakistan. According to the eligibility criteria many students have been awarded laptops.
- An application (app) exclusively dedicated to the Pakistani farmers has been launched by Jazz/Mobilink Company. The app provides necessary information relating to the agricultural needs like farming techniques, weather forecasts, cultivation methods, market rates of crops, animal husbandry, government schemes and other agricultural news.
- Telenor Pakistan has launched its mobile agriculture advisory service 'Khushaal Zamindaar' more than 04 million small scale farmers subscribe to this free of cost service covering a range of cash crops, fruits and vegetables, fodders and livestock and 20 percent of them are women farmers [3].

The first step to improve digital education in Pakistan is to make proper policies and schemes that can help in the implementation of smart systems in educational institutes. It is the responsibility of the government to provide a decent budget to make educational sector better. The government should provide short-term digital courses to teachers to enhance their capabilities. In the same way the most ignored sector which is agriculture should also be provided with same facilities through relevant public and private organizations which are directly and indirectly interacting with stakeholders associated with agriculture i.e. farmers, agriculture researchers, extension staff, teachers, students and input suppliers etc. [4].

#### ***Merits and De-Merits of E-Learning Highlighted By the Respondents***

##### **Merits of e-learning:**

1. The learners are able to link the various resources in several varying formats.
2. E-learning is far cheaper than traditional methods of teaching
3. It is a very efficient way of delivering courses online.
4. Due to its convenience and flexibility, the resources are available from anywhere and at any time.
5. Everyone, who are part time students or are working full time, can take advantage of web-based learning.
6. Web-based learning promotes active and independent learning.
7. As you mostly have access to the internet, you can train yourself anytime and from anywhere also.
8. It is a very convenient and flexible option; above all, the learner doesn't have to depend on anyone for anything.
9. Unlike traditional teaching practices in e-learning the training material is not chosen by teacher or some organization and can help students to obtain their own requirement of knowledge.
10. Not only can you train yourself on a day to day basis, but also on weekends or whenever you have the free time to. There is no hard and fast rule.
11. Through discussion boards and chats, you are able to interact with everyone online and also clear your doubts if any.
12. The video instructions that are provided for audio and video learning can be rewound and seen and heard again and again if you do not happen to understand the topic first time around [5].

##### **De-merits of e-learning:**

1. Most of the online assessments are limited to questions that are only objective in nature.
2. There is also the problem of the extent of security of online learning programs.
3. The authenticity of a particular student's work is also a problem as online just about anyone can do a project rather than the actual learner itself.
4. The assessments that are computer marked generally have a tendency of being only knowledge-based and not necessarily practicality-based.

5. E-learning is structured. When a program is developed, it is based on what the course developers think is the right curriculum at the time. However, learning materials can quickly become outdated, and may contain errors even from the beginning [6].

#### ***Agricultural Education and Training Status in Pakistan***

To achieve optimal production in agricultural activities, small farmers can benefit from personalized training in the field of agricultural extension education. The development of agriculture is a complex phenomenon, which depends on many factors. There are three institutional components involved in the development of agriculture in Pakistan especially Punjab, namely agricultural research; Agricultural education; and agricultural extension. Agricultural research is the main source responsible for improving agricultural productivity through the evolution of high-yielding crop varieties and better production technologies appropriate for soil and climatic conditions. Research stations/institutes participating in agricultural research in the country include: Horticultural Research Station, Sahiwal; Cotton Research Station, Rahim Yar Khan, Cotton Research Station, Multan, Forage Research Institute, Sargodha; Ayub Agricultural Research Institute (ARRI), Faisalabad; Central cotton research institute Sakrand Sindh, Wheat research centre Sakrand Sindh, Nuclear Research Institute for Agriculture and Biology, Faisalabad and the Rice Research Institute, Kala Shah Kaku. Currently, higher agricultural education in Pakistan is taught through five agricultural universities and six colleges. In total, Punjab has two universities and two agricultural colleges. Intermediate level education is offered by three agricultural training institutions in Punjab, namely the Sargodha Agricultural Training Institute, the Barani Dahgal Agricultural Training Institute and the Rahim Yar Agricultural Training Services Institute (IATI) Khan, which offer two-year diploma courses for field assistants under the supervision of the provincial agricultural department. For the field assistant diploma course, students (over 10) are admitted without a job guarantee. The curricula of these institutes have not been significantly revised and the emphasis is mainly on theoretical training, i.e. the lesson on agricultural extension serves as a link between research and the agricultural community. These are responsible for translating, processing, packaging and providing scientific research knowledge to farmers and provide feedback to research scientists. The Department of Agriculture (Extension) under the supervision of the Director General (Extension and adaptive research) is playing its role in the diffusion of agricultural technologies among the agricultural community. Agriculture (extension and adaptive research) is made up of three components: adaptive research; extension; and training Adaptive research is the new verification of research studies that are carried out in different stations, for example Sargodha, Sheikhpura, Vehari, Rahim Yar Khan, Gujranwala, Jehlam and Layyah, adaptive research farm, etc. This type of education is rendered with formalities and boundaries. In this type of system, admission to the institution, attendance, classrooms, classes, theory and practical, examination, follow up of rules and regulations and award of degree and certificate is mandatory. For instance, the education given in schools, colleges and universities is well understood example of formal education. Formal agricultural education is also given in universities and for this purpose various agricultural universities are working across the country. The question is that what are the bottlenecks in these institutes for not producing well-trained extension field staff. This question is largely unanswered. It is imperative to know on scientific lines that what are the deficiencies or constraints with which these institutes are combating. International Linkages and Cooperation in Pakistan, at the provincial government level, agriculture is divided into five sectors: crops, livestock and fisheries, food, natural resources (soil water, forestry and wildlife) and education. Research conducted by federal government agencies is largely a long-term priority investigation, while research conducted by the provincial research system is primarily adaptive in nature. Each of the four provinces has an important agricultural research institute under the administrative supervision of the Department of Agriculture. The four provinces have a number of other government agencies involved in agricultural research in areas such as veterinary sciences, water resources, fisheries, wildlife and environmental issues. Likewise, all other agricultural universities maintain ties with PARC and other research and development institutions.

#### **Methodology**

The research was conducted in four provinces in Pakistan. The major training needs components identified for the study was crop production, vegetable production, fruit growing and livestock. The questionnaire also collected demographic information and information relating to farming characteristics of respondents, including sex, age, education, Franchise/office address, Area etc. The population of this survey was the teachers, students, Input suppliers and their staff, Officials of in-Service Training Institutes, Agriculture research organizations, department of agri. Extension, progressive and small farmers, and the officials of multinational and national input supply companies. In this study 43 respondents were randomly selected out of these institutes and were contacted to acquire information

[7]. Those who indicated their willingness to participate in this study were requested to fill in the questionnaire which was developed by the CABI team and was finalized after incorporating the valuable suggestions/recommendations received from the local and foreign experts. The respondents were personally visited the CABI team (in Punjab and Khyber Pakhtunkhwa) and the enumerators (In Sindh and Balochistan). Questionnaires were distributed to the respondents after briefing about the objectives of the study and research instrument.

### **Sampling and Sample Size**

Sampling was done to select the institutions and organizations to be visited in the study.

- Academic institutions: Universities and In-service Training Institutes (Technical and Vocational Education and Training)
- Multinational and National Input supply companies and dealers
- Employers: Service Providers, County government (Agriculture Extension and Agriculture Research Institutions)
- Agriculture Processors
- Progressive and Small farmers

### **Survey Tools**

One-to-one interview schedules were administered to institutional administrators, students service providers and employees.

### **Data Collection Instruments**

Primary data was gathered from the sample population through interviews. Secondary data was gathered from documents relevant to the survey.

### **Key Informants**

The table below gives a summary of key informants interviewed. Professionals and students are potential learners likely to utilize e-learning platforms to access learning materials (Table 1).

### **Data Analysis**

Data was collected and analysed according to institutions and organizations. The data was interpreted in accordance with the objectives (Figure 1). The data was sorted and categorized into four thematic areas:

- I. Learning and work environment.
- II. Employment
- III. Training needs and skill gap for students and Continuing Professional Development (CPD)
- IV. Digital landscape
- V. e-learning business models

**Table 1:** Summary of interviewed key informants.

Category	Role	Learners Yes (Y)/No (N)	No.
Employers	County Government Service Provers Agro-dealers	N	15
Professionals	Public extension officers (Plant Doctors) Agro-dealer staff Agronomists Lead farmers	Y	15
Academics	Agricultural Students/Graduates (In-service training institutes and Universities)	Y	4
	Heads of academic institutions, Head of Departments. Head of Research organizations	N	6
Farmers	Innovative and educated farmers	Y	3

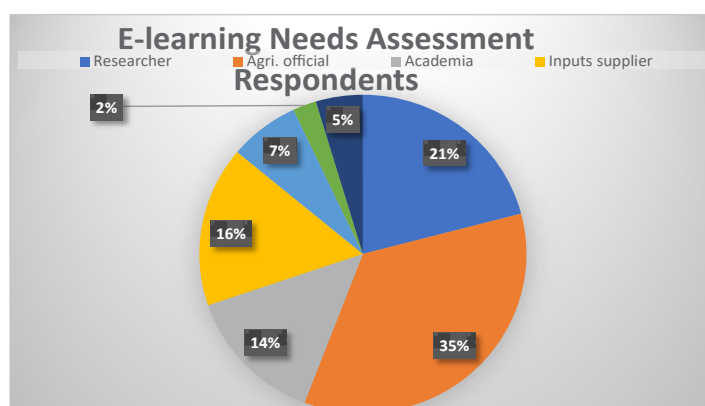


Figure 1: Analysis, sorting and categorization of Data.

### Key Findings and Discussion

This study concludes with the following recommendations:

- Training in pest and disease management should be a priority in all sectors, especially in light of climate change, which can contribute to different pest and disease manifestations.
- Farmers would benefit from exposure to new technologies and practices that have been tested / used by other farmers with similar physical conditions. This may include farmers from other districts or provinces.
- Agricultural extension services and training for farmers should emphasize practical training and observation rather than theoretical training. Furthermore, reflection sessions in the follow-up of the initial practical training could help farmers to learn the new learning correctly.
- Farmers want to learn from each other, but they need tools to do it. Therefore, farmer-to-farmer training (progressive farmers to small farmers) should be facilitated to ensure adequate exchange of accurate information.
- Training would be more appropriate if provided to farmers at the start of new cropping season so that they can immediately put their new knowledge into practice.
- The timing and frequency of training should also be adjusted so that farmers or other stakeholders receive training for one or two hours on average once a week.
- Agricultural extension services could be strengthened by getting feedback from farmers using different methods and responding to that feedback to ensure that services are tailored to farmers' needs and that farmers feel comfortable and satisfied with the type and quality of training they receive.
- It allows learners to access material when needed and study at their own preferred pace without the stress of missing important information.
- Once the material is developed and uploaded online it has no expiry date and could be utilized anywhere in the world.
- It reduces the gap between theory and practice as many organizations have functional websites providing service online.
- Periodic field surveys are recommended to evaluate and monitor changes in farmers' agricultural training needs.
- Conduct an evaluation of farmers' knowledge in key areas before designing new materials and training modules so that their level of knowledge corresponds to the self-assessment and importance attached to each topic.

Such an evaluation would aid further prioritisation of extension services and training in agriculture.

### Learning and Work Environment

The organizations need to consider the impact of social, cultural and economic issues residing within a country when introducing and integrating e-learning into the educational system. These issues significantly affect the thinking of the users and play an important role in shaping perceptions and uptake of technology. Pakistan's public expenditure on education as percentage to GDP is estimated at 2.4 percent in the fiscal year 2018-19 which is the lowest in the

region. According to UNDP's Human Development Report 2018, Pakistan is ranked 150<sup>th</sup> out of 189 countries with the Human Development Indicator (HDI) value of 0.562 (with 1 being the maximum value). According to the educational indicators, only Afghanistan lags behind Pakistan in the context of regional comparison [8,9]. All other regional countries have shown improvement in HDI in comparison to Pakistan. Literacy rate trends show 62.3 percent in 2017-18 with males from 71.6% to 72.5% and females from 49.6% to 51.8%. It is also observed that male-female disparity is narrowing down with time span. Literacy rate increases in all provinces, Khyber Pakhtunkhwa (54.1% to 55.3%), Punjab (61.9% to 64.7%) and Balochistan (54.3% to 55.5%) except in Sindh (63.0% to 62.2%) where marginal decrease has been observed. The education-related expenditure increased by 18.6 percent (to Rs 829.2 billion) in 2017-18. The provincial governments are also spending a sizeable amount of their Annual Development Plans (ADPs) on education. Punjab increased its expenditure in 2017-18 to Rs 340.8 billion as compared to Rs 260.6 billion in 2016-17 which shows a significant increase of 30.8 percent. Sindh also increased its expenditure from Rs 146.7 billion in 2016-17 to Rs 166.0 billion in 2017-18 showing an increase of 13.16 percent. Further, Khyber Pakhtunkhwa and Balochistan also increased their expenditure on education from Rs 136.1 billion to Rs 142.6 billion and from Rs 47.7 billion in 2016-17 to Rs 52.8 billion in 2017-18, respectively.

#### ***Agricultural Courses offered by the institutions in Pakistan***

Pakistan's all major universities mostly offer admissions in all the major Agricultural programs. Moreover, there are also such universities, who offer admissions in only one or two specialized Agriculture programs. The Institute offers Postgraduate Diploma in Food Safety & Controls initiated with the active support of European Union (EU) funded Trade Related Technical Assistance (TRTA II) Program implemented by UNIDO. The Institute also offers Diploma in Meat Science & Technology to meet the requirements of meat processing and catering industry. Besides these courses, NIFSAT in collaboration with Department of Continuing Education (UAF) and Punjab Skills Development Fund (PSDF) offering diploma courses of 6 months duration in the following domains:

- Fruit Preservation
- Advance Food Production
- Meat Technology
- Meat Handling & Processing
- Citrus Processing
- Dairy Technician
- Fruit Preservation, Packaging and Logistics

The Institute offers short skill development courses in fruit and vegetable preservation and baking. The basic qualification for these courses is Matriculation. Both male and female are eligible in short course related to fruit & vegetable preservation. Besides for matriculate youth/farmers, University of Veterinary & Animal Sciences (UVAS) is offering certificate courses and vocational educational programs in livestock, poultry, dairy, fisheries, wildlife, etc. This institute has so far trained thousands of farmers, paravets and veterinarians in different disciplines of livestock production and management [10]. The major beneficiary organizations for training programs up till now are:

- Livestock & Dairy Development Department of Punjab
- National Rural Support Program (NRSP)
- Punjab Rural Support Program (PRSP)
- National Vocational Technical Training Commission (NAVTTTC)
- Nestle Pakistan
- United Nations Development Program (UNDP)
- ASLP
- Tetra Pak
- Following certificate training courses are offered with collaboration of different NGOs;
- Village Veterinary Workers (Duration 3 months)

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- Artificial Insemination Technician (Duration 6 months)
  - Dairy Herd Management (Duration 3 months)
  - Community Livestock Extension Workers (Duration 1 month)
  - Veterinary Poultry and Dairy Assistant (Duration 6 months)
  - Fish Farming (Duration 6 months)
  - Carrier Opportunities for Trainees
  - Technical staff at livestock farms
  - Self-employment
  - Vaccinator
  - Artificial Insemination Technicians

The faculty besides under- and post-graduate degree programs offers short duration courses as listed below. Their admissions are made through the Directorate of Agriculture Education and Extension. These courses are meant for field staff, farmers and other interested persons and the students to enhance their wisdom and skills. These short courses are both for males and females, a few of them are only for gents therefore, the candidates are requested to ask before admission. These courses are generally offered during summer. At the end the students are evaluated through written and oral examination and awarded a certificate.

#### ***Teaching Methods and Use of E-Learning in the Institutions***

E-learning is the result of the innovative transfer of knowledge and learning which has been heavily influenced by the advent of the Internet and information and communication technologies (ICT). A recent trend observed in higher education is the introduction of e-learning systems to provide students with online access to learning content. The main driving forces behind this trend are the changing demographic factors of students, the changing conditions for the provision of education and innovation in technology itself. Many higher education institutions have failed due to poor strategies, high technology costs, resistance to change, competition and poor course delivery [11]. These problems become more pronounced for developing countries, such as Pakistan, which have limited resources and technical experience compared to developed countries. Even so, the experience of e-learning in education goes far beyond entertainment. However, with little public expenditure on education and low literacy rates, Pakistan faces the challenge of effectively integrating e-learning systems into the education system. Simply offering online courses and trying to reproduce the experience in the classroom can cause unexpected difficulties. The persistent frustration and dissatisfaction of students with the use of web-based learning is often due to late feedback. This requires more student-focused research to identify their preferences and opinions in terms of e-learning.

#### ***Attitude of University Lecturers to eLearning***

Most of the classes are very boring because the teacher keeps on speaking without any class participation. Classes are usually dull and boring, involving long lectures. The teachers come and hurriedly keep on dictating the topic. Students with good listening skills and who are good at making notes understand but the others are left behind. But, they try to make student actually understand the topic. Teachers do not explain well; do not put effort in the work they do, their overall standard of teaching is poor; control in the class over students is poor, style of teaching is incorrect.” Nevertheless, teachers are still a long way away from implementing the new methodology in the classroom. The idea of improving teachers’ skills is being recognised by both private and public educational institutions and in-service teachers are required to attend workshops to learn more from the educational point of view.

#### ***Employment Challenges and Skill Gap of Agricultural Graduates***

Employment is often defined as a set of skills, understanding and personal attributes that make graduates more likely to get a job and succeed in their chosen professions, for the benefit of themselves, the workforce and the community and economy. The job market requires graduates with theoretical and practical knowledge. This is an incentive for universities and potential graduate employers to change the direction of graduate production by integrating university course learning with off-campus practical work in the internship and cooperative education format. In addition, employers' expectations are different and cannot be easily determined due to the many factors that can influence the need for hires or the needs for hiring.



Few graduates manage to obtain additional qualifications, such as IT and computer skills, and most of them have difficulty obtaining these additional skills or qualifications after graduation. There is no single way to improve postgraduate employment in agriculture. It requires a holistic approach, integrating knowledge, work experience and the development of technical and interactive skills and reflecting on how these can meet the needs of a flexible organization. The results show that the lack of exposure of students to the real world of work, the lack of orientation and adequate professional information and the lack of adequate practical skills are the most important factors influencing employment [12]. There are skills, especially in the communication, administrative and computer skills set that are not adequately addressed in the curriculum. The list of skills identified by employers and graduates as essential or very important and reflecting a low level of preparation or competence is very similar.

### **Digital Landscape Environment for E-Learning**

**Status of ICTs in institutions in Pakistan:** In Pakistan, agricultural extension staff is using different mechanisms for dissemination of agriculture information and knowledge in the agricultural community. Among them, modern information and communication tools play an important role in improving the availability of information on crops, markets and agricultural development. Pakistan still needs to do much to reap the benefits of e-learning to compete with international educational standards. Large data and information can be generated, stored, analysed, disseminated and used effectively to improve agriculture through the inclusion of information and communication technology. You can increase multiple productions by providing farmers with fast, reliable and local information services. In Pakistan, only one agricultural extension department is responsible for transferring agricultural information to the agricultural community and acts as a bridge between the research institute and farmers. The government is trying to implement ICT initiatives to revolutionize the education system. Currently, ICT is widely used in the higher education system of the major cities of Pakistan, namely in Karachi, Lahore, Peshawar, Quetta, Islamabad, etc., but when their use is measured across the country, their use. The current it's 50 percent. The main causes of low level of higher education as suggested are

- I. Poor or uneven distribution of ICT resources and infrastructures,
- II. High ICT expenses and lack of money,
- III. Poor or no solid ICT policy,
- IV. Incorrectly viewing ICT as a problem for organizational transformation,
- V. Not making ICT responsive to the organizational vision and mission, and
- VI. Developing a non-systemic method of implementation of ICT policy.

**Student's computer literacy and ownership of smartphones and computers:** According to the Pakistan Economic Survey (2016-2017), the country's literacy rate has decreased from 60% to 58%. This infusion of computers and other digital technologies into program development and implementation is steadily increasing. Every day new applications and devices are studied, developed and used to improve the quality of the results. In many interesting ways, technology has been able to solve the complexities and challenges of public service in education. Innovation has ensured effectiveness in program management, classroom learning experience and professional development in the education system. Since Pakistan is missing globally with regards to digital literacy, there is a great need to look at the situation and maximize the benefits of digital literacy because in this era of innovation and technological progress, digital literacy is recognized as new label for education. Teachers and students have no other option to reach a digital literacy level with the digital world on the rise [13]. Governments, as well as higher education institutions, also strive to provide online learning environments to acquire some levels of digital literacy from ordinary people and college students.

Most of the students had a higher level of perceptions towards digital literacy in three factors, first understanding of digital literacy, second searching for information through digital tools, and third digital literacy in the critical evaluation of information, interaction in online and online tools, while students had a moderate level of digital literacy in the management and communication of the information factor, and digital literacy in collaboration and participation in the digital content factor. Furthermore, digital literacy has had significant effects on students' communication, research and trust skills.

**Agricultural extension agents and improved technology:** Extension agents regularly look for information to do their daily work. The agents sought a variety of sources of information not only for their knowledge but also to meet their customers' information needs. Extension agents often communicate with a variety of information sources. Among the most important were: clients, office agents, extension specialists, immediate supervisor, local news agencies,

local business organizations, state / federal agencies, teachers and local school administrators. Extension agents suggested that higher spread rates can be achieved by providing resources and training to farmers [14]. Extension agents also reported that lack of resources followed poor knowledge, illiteracy among farmers, and reluctant to adopt improved technologies, communication problems, lack of literature, lack of training in improved technology services, cooperation of farmers as regards and poverty are the main challenges they face during their daily activities.

**Extension agent training:** Regular training is the basis for effective extension agents due to the rapid changes that occur in the extension environment because in-service training will help expansion develop the knowledge, skills and attitudes needed to satisfy a growing set of different needs for today. Most extension agents said they need training for better crop management, especially diagnostic techniques for pests and insect diseases and their best management practices, followed by computer science, Integrated Pest Management (IPM), garden management and extension training, office management and drafting and planning of proposals, respectively.

**Training of the input Suppliers:** Effective institutional linkages among extension service providers, research organizations, educational institutes, and farmers are inevitable for an efficacious Agricultural Knowledge and Information System. Pesticides dealers (New & Old) trained in safe handling and effective use of pesticides as well as about Pesticides Ordinance 1971 amended up to 2012 and Rules 1973, identification of insect pests, diseases and their timely appropriate control measures, identification of useful insects and the conservation & use of Bio-control agents against insect pests of crops at Tehsil & District levels according to procedure and schedule.

The schedule of training has been revised for the convenience of candidates. The training was offered two times in a year at the interval of 6 months i.e. first in April and 2nd in the November. The candidates are required to contact the office of concerned Assistant Director of Agriculture (PP) well in time before the commencement of training.

#### **Trainings of farmers and private extension workers:**

Pest warning and quality control of pesticides which work under directorate of agricultural extension is currently offering trainings for the Farmers & Extension Workers in:

- Identification of insect pests, diseases and their timely appropriate control measures.
- Identification of useful insects.
- Safe handling of pesticides, plant protection machinery and their proper use.
- The conservation and use of Bio-control agents against insect pests of crops.

Governments and development agencies recognize the potential for IT and online technologies to become a vital tool in improving agriculture and as a result a number of innovative communication technology schemes have been set up. However, despite best efforts, the technology is still poorly understood and used infrequently. The advice of field assistants/agriculture officers was considered more reliable than that of input suppliers, but we found that extension workers were under resourced inadequately trained in technology and lacked any affordable system of communication with the farmers. This has led to low morale amongst many, although there was noted to be a wide disparity in the quality of service from the public extension staff, as was the difference between public and private sector. High transportation costs and lack of budget mean that sufficient visits by field extension staff to the farmers in their area aren't taking place.

#### **Major Challenges in E-Learning in Pakistan**

The main challenges identified by researchers that inhibit the expansion of e-learning in agriculture are very similar to the barriers that prevent other sectors from developing solid e-learning programs.

**Gaps between coaches and designers:** The main problems lie in the inability of educators to bridge the technical gap. Not only must they identify the knowledge and skills that students and farmers need, but they must also find out how to present the material in an appropriate and user-friendly design so that e-learning can translate that information into applicable solutions. in the company. "Many extension and faculty agents lack educational design skills to develop courses and programs using distance education strategies".

**Challenges faced by coaches/instructors:** Agricultural instructors face challenges similar to those faced by people working in other fields. these problems include:

- lack of time and skills necessary for the adoption of new technologies
- lack of formalized reward system and technical support
- A concern about the loss of the teacher-student relationship

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- marketing for programs
  - financial premiums
  - Maximize returns on your investment in time and money
  - significant increases in administrative work

**Challenges faced by students/farmers:** This is particularly relevant for agricultural training due to the tendency of farmers and experts to separate over long distances. However, it is the nature of the material that presents the greatest difficulty from the students' point of view, which in this case can be extension agents, farmers, trainers or teachers of agriculture; an important challenge for e-learning and distance education. In agriculture, a practical component is needed. Whether they use new techniques or new technologies, farmers should receive working examples so that they can see them in action with their own eyes. This practical component is an important limitation of e-learning in agricultural training that local extension agent's face.

#### ***Proposed framework for Digital Learning in Pakistan***

Many organizations, institutes, universities, schools and companies are investing large amounts of time and money in developing online alternatives such as e-learning for traditional types of education and training systems. E-learning in agriculture-related sectors is still in the early stages of adoption, but is being implemented more than ever. Farmers in general have been limited by time and finances, by commitment to the family and by work, and by responsibilities in running the farm or family business. This study proposes a framework for the application of e-learning in agriculture in Pakistan.

The proposed framework is applied in three different stages of the educational process:

- I. Development of the platform,
- II. Development and delivery of courses,
- III. Evaluation of platforms and courses.

#### **Platform development:**

The first phase of the proposed framework is the development of an innovative e-learning platform. This platform will be a learning management system which aims to be an asynchronous (Offline) learning system. Asynchronous learning can also be done when the student is offline and courses are delivered through the Web, e-mails and message boards which are then published on online forums. In such cases, students/learners ideally complete the course at their own pace, using the Internet simply as a support tool rather than undertaking exclusively for e-learning software or interactive online lessons to provide and manage learning content. A completely new platform designed exclusively for this reason. In addition to the above, the proposed system must provide adequate tools and functionality for both students and educators. Educators must easily manage their online lessons and provide educational content, while students/learner can easily use the platform and take advantage of its features and abilities.

#### **Course development:**

The second phase of the proposed framework is the development of suitable courses for the agricultural sector. The courses held in the e-learning platform must cover a wide range of sectors related to agricultural techniques. Since techniques and supplies have often improved in the agricultural sector, courses must be updated accordingly with all developments in agricultural sciences.

#### **Evaluation of the platform:**

To verify the extent of acceptance of the e-learning platform by users, it is necessary to use the Technology acceptance model. According to this model, TAM is studying the factors that influence the user's intention to use an information system, an environment or just information, and proposes the connection between two main factors: perceived ease of use and usefulness perceived. The adoption of a technology depends mainly on the perceived ease of use and the perceived usefulness of this technology by the user. Consequently, the usefulness of a system and its ease of use must be carefully evaluated.

### **Conclusion and way forward**

E-learning in agriculture is still very new but the study indicated that Cooperative Extension could serve as a change agent. The business plan for eLearning programs in agriculture being undertaken in Pakistan will be the pioneering

phase. Adoption of eLearning for Agriculture in Pakistan is very low but interest is high and growing among the relevant stakeholders especially the staff associated with Academia, representative of the National and multinational input supply companies and the officials of research institution. This trend is less popular among farmers and input suppliers as the companies associated with them are providing the technical assistance and on spot remedies for the plant health, crop nutrition and crop management practices. Key elements driving adoption are strong organization support, particularly the presence of a “champion”, and buy-in from management and teachers/trainers. Underdeveloped technology infrastructure, limited computer and internet skills, and high access costs are all major barriers to adoption. The other factors which hinder the adoption of e learning in agriculture are not easy to setup a pilot program for testing before roll out, high cost of internet access, limited computer and internet skills of target learners, limited computer and internet access of target audience, limited technology infrastructure in the region, limited budget for eLearning activities, limited availability of eLearning content in the local language and limited availability of eLearning content in subject matter of interest.

The adoption rate of e learning in agriculture will be high if the content will be compatible with existing approaches, it must be cost effectiveness, ability to reach more learners, proven benefits, availability of eLearning content in subject matter of interest, high level of available technology and resources in the organization, good organizational support, strong opinion leader and champion for the use of eLearning, seen as being able to meet organizational learning needs and strong interest of teachers/trainers in using e learning.

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