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e-Readiness of teachers in higher agricultural education of north eastern hill states of India

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ABSTRACT

This study seeks to examine ICT integration and e-readiness of teachers in higher agricultural education in the North Eastern Hill (NEH) states of India. The paper draws from the Perceived e-Readiness Model (PREM) and relies on data collected from a survey of agricultural colleges from six NEH states of India, i.e. Arunachal Pradesh, Manipur, Meghalaya, Mizoram, Sikkim and Tripura. Results of the study reveal that the awareness level about electronic portfolio among the teachers was quite high however, inadequate availability limits its usage. Smart phones and computer were used daily by 88 and 92% of the respondents. Use of other tools like video conference, e-portfolio, digital student report card, virtual class room and e-library was reported to be in the range of 1-14% only. Several individual factors, viz. training in ICT, operational knowledge of ICT tools, workload etc. were found to be affecting their usage. Among institutional level barriers, internet speed, supporting ICT infrastructural facilities and access to quality ICT tools were observed as key factors influencing ICT use and its integration in the higher agricultural education of the NEH states of India.

Key words: Agricultural education, e- learning, e-Readiness, ICT integration

The reasons for introducing Information and Communication Technology (ICT) in educational institutions are four-fold: technology innovations, globalization of economy and information, knowledge based economy and society and increasing demand for education (Temba 2013). The role of ICT in promoting economic growth and development has gained prominence globally. Economies are been transformed from industrial to knowledge-based where knowledge is recognized as a driver of productivity and economic growth (OECD 2000, Kuznetsov and Dahlman 2008).

It is expected that adopting and using ICT in educational institutions would lead to significant expansion of education and academic outcomes which are beneficial to both teachers and students. When used appropriately, ICT can help to support the value of education by increasing access to education opportunities, raising quality of education by making learning and teaching an active process connected to real life (Zaman *et al.* 2011). Academic institutions, corporations, and government agencies worldwide are increasing their use of the Internet and digital technologies to deliver instruction and training. At all levels in these institutions, individuals are being encouraged to participate in online learning activities that focus on real change in pedagogy and the promotion of life-long learning. New educational policies are being formulated in various communities worldwide to enable educational institutions to come to terms with new learning technologies and their implications (Khan 2016). Agricultural professionals in India have an important role in developing and dissemination of agricultural technologies to enhance the productivity of the farming community. But to implement strategic initiatives into effectual function, they must be e-ready (Srinivas *et al*. 2017). e-Readiness (electronic readiness) assesses the quality of a country's ICT infrastructure and the ability of its consumers, businesses and governments to use ICT to their benefit. McConnell International (MI) in 2001 and Association of Southeast Asian Nations (ASEAN) in 2001 defined e-readiness as the degree to which an economy or community is prepared to participate in the digital economy. Since the concept of "e-readiness" is relatively new, it can be visualized at different levels (Rai 2014). The first one is *"Individual e-readiness"* the degree to which an individual is able to access and use the ICT tools and has the necessary skills to get himself/ herself updated with the technological developments. The second level, *"Institutional e-readiness"* is the degree to which an institution possesses infrastructure, network accessibility, policy support and

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affordability to acquire and effectively utilize ICTs. Also it should possess sufficient skilled manpower to efficiently and effectively utilize the available ICT infrastructure and the third one *"National e-readiness"* is the degree to which a nation possesses necessary infrastructure, internetwork accessibility, affordability, policy support and the human resource with necessary skills to acquire, access, utilize ICTs.

The Agricultural Education Division, ICAR is involved in **s**trengthening and streamlining of higher agricultural education system to enhance the quality of human resources in agri-supply chain to meet future challenges in agriculture sector in the country. This calls for regular planning, development, coordination and quality assurance in higher agricultural education in India. For creation and development of skilled human resources in agriculture in North-Eastern Hill (NEH) states a Central Agricultural University (Imphal, Manipur) was established by the Department of Agricultural Research and Education (DARE), Government of India. The university became functional during September, 1993. The jurisdiction of the university extends to six NEH states: Arunachal Pradesh, Manipur, Meghalaya, Mizoram, Sikkim and Tripura. It offers undergraduate teaching and postgraduate teaching, research and extension activities in NEH region of the country. Information on usage of ICT resources in these colleges was not readily available. Hence, the present study was undertaken with aim to measure the e-readiness of teachers/institutions engaged in higher agricultural education and facilitate the scaling up of innovations that have a demonstrated impact on student learning. This would provide useful information for policy makers, university leaders, administrators and teaching staff to adopt and adapt these innovations in higher agricultural education system.

MATERIALS AND METHODS

The present study was conducted during 2016-17 to examine the e-readiness and e-intensity in higher agricultural education in the NEH states of India as a part of nationwide project on "Impact of information and communications technologies on Agricultural Education in India". From six NEH states of India, i.e. Arunachal Pradesh, Manipur, Meghalaya, Mizoram, Sikkim and Tripura, a total of 120 teachers from 7 colleges had taken part in the survey, which constituted about 60% of the total population under investigation. In absence of appropriate model to investigate e-readiness in developing countries Molla and Licker (2005)'s Perceived E-Readiness Model (PERM) has been used with suitable modification. Perceived e-Readiness is defined as the degree to which an organization evaluates that it has the internal preparations and favorable external conditions to conduct e-learning. Thus the concept has two constructs- Perceived Organizational e-Readiness (POER) and Perceived External e-Readiness (PEER). Taken together, PEER and POER should predict e-learning adoption and explain a significant part of the variance in the level of e-readiness. *"Individual e-readiness"* was assessed in terms of ability to access and use the ICT tools with necessary skills to get himself/herself updated with the technological developments. The second level, i.e. *"Institutional e-readiness"* was assessed by examining institutional infrastructure, network accessibility, policy support and affordability to acquire and effectively utilize ICTs. The present study included 12 factors that could be categorized into economic, socio-cultural, technological, and organizational factors, and the factors related to ICT access, ICT competences, and ICT usage. The survey questionnaire was elaborated and a five-point Likert scale was used as follows: 1–strongly disagree, 2 – rather disagree, 3 – neutral, 4 – rather agree, and 5 – strongly agree. Percentages, frequency distributions and mean were used to analyze the collected data with the aid of the Microsoft Excel and Statistical Package of Social Sciences. The data were collected through structured interview schedule to obtain necessary information from the respondents.

RESULTS AND DISCUSSION

Personal profile of the teachers: It is not just the students who have to be studied for assessing the integration of ICTs in the educational system but also the competencies, skills and efficiency of the teachers is important to make it a two-way interactive and successful approach. In this context the personal profile of the teachers has been studied and the results are tabulated below:

From the Table 1 we can observe that majority of the teachers (69.17%) are of middle age between 33-51 years. Of both the genders, men constitute the majority (82.50%) than the women teachers. Most of the teachers (57.50%) are from the rural background and 85.83% have their highest qualification as Ph D. The service experience of the teachers reveals that 70.83% of them are ranging between 3 to 23 years of teaching experience. It was observed from Table that only 23.33 per cent teachers received training on ICT. A recent wok of Ziemba (2016) found that gender, education, and place of residence do not reflect significant differences on the factors. Yet, there are significant differences among the factors that could be attributed to age. Younger adults were found to respond positively to the demands of information seeking in the digital environment while their older counterparts are still struggling to come to terms with the changes (Yusuf *et al.* 2016). In the same vein, studies have revealed that the value placed on technology by men and women varies. While men express high level of confidence in navigating the digital environment, women still suffer low self-confidence in doing same. Yi (2008) also asserts that those with higher education levels are more likely to use ICT because they may have more skills and chances to go online. Furthermore, a recent work of Aramide *et al.* (2015) revealed that demographic variables such educational qualification, ICT use experience, and teaching experience do predict the use of ICT by science teachers but are negatively related to ICT use.

Awareness and availability of ICT tools and technologies: Teachers are considered to be the most important influencing factor on classroom learning and, as

Table 1 Distribution of teachers according to their personal characteristics n=120

Characteristics	Range	Teachers	
		Frequency	Percentage
Age	Below 33 years	16	13.33
Young			
Medium	Between 33-51 years	83	69.17
Old	Above 51 years	21	17.50
Gender			
	Men	99	82.50
	Women	21	17.50
Family background			
	Rural	69	57.50
	Urban	51	42.50
Educational qualification			
	M Sc	16	13.33
	Ph D	103	85.83
	Postdoc	1	0.83
Service experience			
Low	Below 3 years	15	12.50
Medium	Between 3-23 years	85	70.83
High	Above 23 years	20	16.67
Training received on ICT		28	23.33

such, play an invaluable role in ensuring that pupils use ICT effectively inside the institution. The level of awareness of the teachers on ICTs and the availability has an important role to play in enhancing their teaching skills and making the teaching-learning process more qualitative. An effort was made to know about the basic information on the awareness and availability of various ICT tools used by the faculty members. A list of ICT tools and techniques that are generally used in agricultural education was prepared and based on that the database on awareness and availability of the ICT tools were computed.

Data in Fig 1 reveals that all the teachers were aware of computer, projector, Wi-Fi/LAN, mobile phones and television, whereas availability of these ICT tools among the users was also found be above 90%. The ICT tools and technologies such as e-library, interactive white board, video conference, virtual classrooms and teleconferencing was known to the highest majority of teachers however, availability of these tools were found low. Digital student report card and virtual classroom concept is known by 66.67% and 88.33% respectively but its use in the system has been only 9.17% and 33.33% respectively. This may be due to lack of institutional support to implement these facilities in the university. In education, the electronic portfolio is collections of a students' work that can advance learning by providing a way for them to organize, archive, and display work. The electronic format allows an instructor to evaluate student portfolios via the Internet, CD-ROM, DVD, or zip disk. Electronic portfolios have become a popular alternative to paper-based portfolios because they provide the opportunity to review, communicate and give feedback in an asynchronous manner. Awareness about electronic portfolio among the teachers was quite high (65%) but usage was very low (16.67%).

Usage of ICT tools and technologies: After preparing a database on the availability and awareness of the prepared ICT tools and technologies, a similar effort to compute a database on usage of the ICT tools and technologies was prepared. From the Table 2, it could be understood that the use of ICT tools and technologies in agricultural education depends on the awareness availability and of the specific tool mentioned on the list. The data in Table 2 reveals the usage of the listed ICT tools and technologies by the faculty members. It showed that 27.50% of the faculty members used interactive white board daily. In case of computer, majority (91.67%) of the faculty members used it daily. The use of projector on daily basis was 25%. Daily use of video conference, teleconference, e-portfolio, digital student report card, virtual class room and e-library was to the tune of 0.8 -14.2%. This is in consonant with the data in Figure 1 where a majority of the respondents reported poor availability of the ICT tools resulting in less usage. However, the Table also shows that majority (52.50%, 73.33% and 83.33%) of the respondents used television, Wi-Fi/LAN and mobile regularly, respectively.

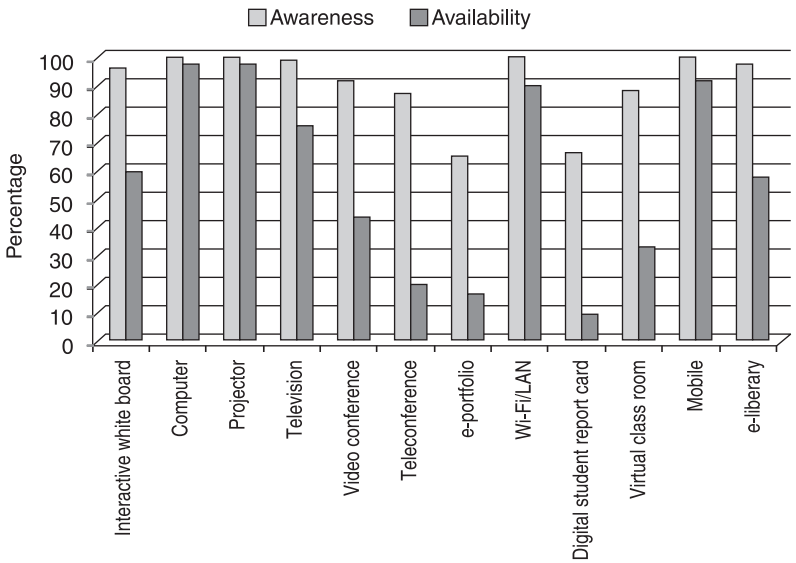

Fig 1 Awareness and availability of ICT tools and technologies among the teachers.

Factors influencing the adoption of ICT:

Factors for the adoption and usage of ICT in education were identified based on the literature review. However, these tend to be studied in isolation, are fragmented, and as such the key determining factors are not well understood in NEH region of India. While there is no doubt that human, social, economic, political and other factors impact

Table 2 Distribution of teachers according to usage of ICT tools and technologies (n=120)

Items	Level of usage					Mean	Rank
	Never	Occasionally	Monthly	Weekly	Daily		
Interactive white board	44 (36.67)	26 (21.67)	4 (3.33)	13 (10.83)	33 (27.50)	2.71	VI
Computer	3 (0.25)	2 (1.67)	1 (0.83)	4 (3.33)	110 (91.67)	4.80	I
Projector	2 (1.67)	26 (21.67)	10 (8.33)	52 (43.33)	30 (25.00)	3.68	IV
Television	29 (24.17)	16 (13.33)	5 (4.17)	7 (5.83)	63 (52.50)	3.49	V
Video conference	78 (65.00)	37 (30.83)	2 (1.67)	1 (0.83)	2 (1.67)	1.43	IX
Teleconference	95 (79.17)	22 (18.33)	1 (0.83)	-	2 (1.67)	1.27	XI
e-portfolio	97 (80.83)	13 (10.83)	3 (2.50)	1 (0.83)	6 (5.00)	1.38	X
Wi-Fi/ LAN	10 (8.33)	13 (10.83)	-	9 (7.50)	88 (73.33)	4.27	III
Digital student report card	114 (95.00)	3 (2.50)	1 (0.83)	1 (0.83)	1 (0.83)	1.10	XII
Virtual class room	87 (72.50)	14 (11.67)	4 (3.33)	5 (4.17)	10 (8.33)	1.64	VIII
Mobile	10 (8.33)	5 (4.17)	2 (1.67)	3 (2.50)	100 (83.33)	4.48	II
e-library	44 (36.67)	28 (23.33)	14 (11.67)	17 (14.17)	17 (14.17)	2.46	VII

Figures in parentheses indicate percentage

on ICT adoption, the significance of the influence of each factor needs to be understood. The present study attempted to address this issue by identifying those factors which exert significant influence on ICT adoption. Understanding such significance would enable appropriate policy reviews and intervention strategies that support ICT adoption.

The Fig 3 reveals that infrastructural facilities (87.50%), internet speed (85.00%) and training on ICT (83.33%)

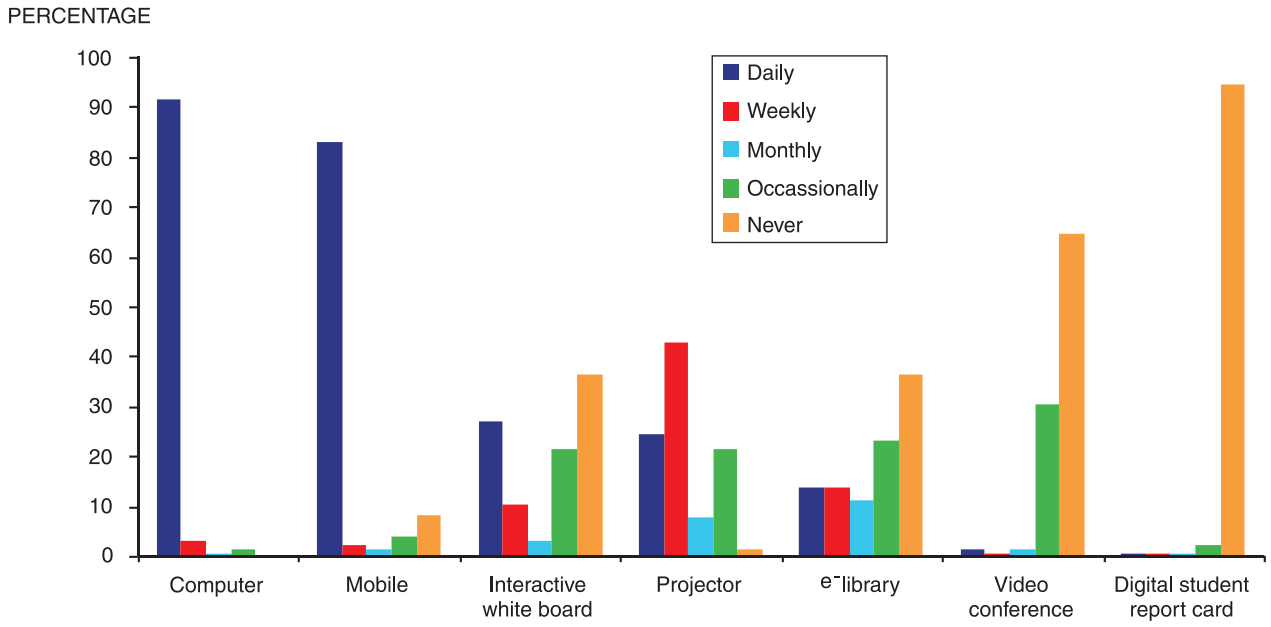

Fig 2 Distribution of teachers according to usage of ICT tools and technologies.

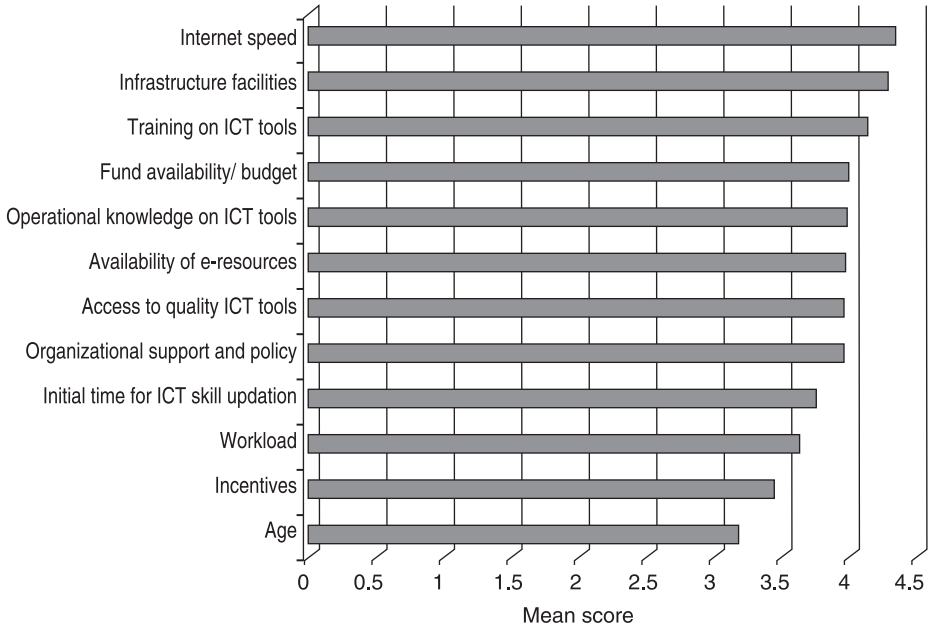

Fig 3 Intensity of factors influencing adoption of ICT.

were the most influential factors for adoption of ICT as agreed by the majority of the teachers, whereas 59.17 per cent teachers strongly agreed that internet speed was major concern for ICT usage. Lack of training in technological developments and support were also identified as constraints by Pandey *et al.* (2016). Other factors like operational knowledge of ICT tools and organizational support and policy were also affecting significantly for adoption of ICT as equal percentage (75%) of teachers has agreed. Other factors in descending order of agreement are availability of e-resources, fund, access to quality ICT tools, initial time requirement of ICT skills updation, incentive and age. Srinivas *et al.* (2017) reported that usage of ICT tools was positively influenced by infrastructure facilities, training, operational knowledge, access to quality ICT, internet speed, availability of e-resources and work load with teachers.

In this age of technological explosion, information has become the most valuable asset, putting education sector under pressure to deliver according to demand. Indian agricultural varsities have acknowledged the importance ICT in building a modern educational system in sync with the new developments of information society. It is recommended that agricultural varsities should enhance the computer and internet skills of teachers by infusing instructional strategies that require both teachers as well as students to make use of ICTs for academic and research purposes. In addition, validating and updating the e-course materials and technical components should be considered through proper feedback and training mechanism.

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