J. Farm Sci. Spl. Issue, 34(5): (476-477) 2021

RESEARCH PAPER

ICT based e-Resources for improving quality in agriculture education through e-Resources

M. G. CHANDRAKANTH AND G. B. LOKESH

Former Director, ISEC, Bengaluru and Assistant Professor, Dept. of Agri Economics
University of Agricultural Sciences, Raichur - 584 104, Karnataka, India

(Received: August, 2021 ; Accepted: December, 2021)

Abstract: The ICT based e resource is crucial for students to understand, perceive, conceive and appreciate concepts used in different branches of agriculture and needs to be used to complement the teaching efforts. They can never substitute the teacher in class room and field situations.

Key words: Internet of things, Technology, Variety, Yield

Introduction

Information and Communication Technologies through Internet of Things (IoTs) have been fascinating human kind in different aspects of human life. In fact, the internet has become almost identical with an umbilical card connecting the mother as information with all its stakeholders as children. The exponential demand for the growth of internet to support ICT and IoTs both from urban and rural areas is the prima facie indicator of the space of internet, that the performance of service providers will decide their presence in the market. IoTs and ICTs for education in general and Agricultural education in particular are crucial and vital. Certainly, ICTs and ICT based e – resources are more fascinating and scintillating for teachers, students and the farmers. However, it is crucial to note that ICTs can at the bestcomplement but not substitute the education, teaching, training, extension efforts.

Embodied and disembodied technologies. Students are taught both embodied and/or dis-embodied technologies in crop production. The 'embodied' technology, is the contribution of 'new seed', and 'disembodied' technologies are the contribution of chemical fertilizer, pesticides, new agronomic practices, irrigation, and so on. The embodied and disembodied technical changes themselves are complementary and difficult to separate.

Role of agricultural extension education – disproved Malthusian theory of population

In a major study of investment analysis in agricultural research and extension in Indian agriculture, Evenson, Pray and Rosegrant (1999)[1], indicated that this investment accounted for 75 per cent of the growth in (total factor) productivity. In the 1960s, the contribution of HYVs of wheat developed by CIMMYT of Mexico and that of HYVs of rice developed by IRRI of Philippines, were the mainstay in technology. The benefits from green revolution technology were the greatest between 1966 and 1976 in the Wheat and Rice cultivating regions. In 1992-93, 90 per cent of the wheat area, 70 per cent of the paddy area, and 50 percent of the coarse grains area were occupied by the modern varieties. Since 1956, the food production has been growing @ 2.3 per cent, more than the population growth rate, disproving the Malthusian theory of population, that while population increases by geometric progression, food production increases at arithmetic progression.

Considering the time series data on production from 1956 to 1987 for 19 food grains in 13 states of India, Evenson et al indicate that before and during the green revolution, the agricultural extension services were the largest source of growth in agricultural productivity. During 1977-87, the growth in total factor productivity was 50 percent higher than before green revolution. The estimated marginal IRR to agricultural research and extension in India is 55 per cent (for the period 1956-1987).

Agricultural extension contributed the most to green revolution

Total factor productivity is the contribution of non-conventional inputs such as research, markets, roads, extension, infrastructure etc to the growth. Considering the growth of 1.31 percent in the total factor productivity of Indian Agriculture between 1956 and 1987, the proportion of area under modern varieties contributed to 11 per cent of this growth, public research investment contributed to 38 per cent, private research to 14 per cent, extension contributed to 58 per cent, improved markets to 7 per cent, irrigation to 9 per cent and use of chemicals to 21 per cent.

Training and visit System

Popularly referred to as T and V system, this method of integration of the scientists of the Agricultural University called Subject matter specialists, and the Grama Sevaks of the Department of Agriculture to impart technical knowledge and skills to farmers largely constituted the Agricultural Extension responsible for the largest contribution for the green revolution.

What is the lesson from Agricultural Extension's role in green revolution in teaching in Agricultural Universities?

The greatest lesson from the success of India's green revolution is that it was Agricultural Extension which contributed the most to the total factor productivity during green revolution. And therefore, Agricultural extension system, which then consisted of the University of Agricultural Sciences and the Department of Agriculture through Gram Sevaks, are necessary in imparting technology to farmers. Therefore, in teaching students in Agricultural Universities too, teachers are the most crucial and the role of ICT and E resource-based teaching can only complement or supplement the teacher, but not substitute the teaching efforts in any way.

Dominance of the Practical component in courses

The Bachelor of Science (Agri) is the most offered degree program in State Agricultural Universities. The course is extremely interesting precisely because there is practical component in almost all the courses taught. A cursory examination of the theory and the practical content in the degree program indicates in the four years of degree program, about 55 percent of the total time is devoted to practical and 45% of the total time is devoted to theory classes.

The hall mark of the BSc Agri degree program is that it has the practical component exceeding the theory component in general for most or all of the courses. For instance, even in courses such as English, Kannada, Mathematics, in the State Agricultural University system there is compulsorily the practical component.

Prominence given to skill development in practicals

In practical classes the students are not only taught the practicals, but also the theory behind the experiment conducted in each practical. The students are taken through the phases of:Seeing is believing; Listening is understanding on to finally Doing is learning. Therefore, even though the first two almost lead to the third, unless the third aspect is performed by the students on their own, their learning is incomplete.

Importance of ICT based e courses

Information and communications technology (**ICT**) emphasizes on the contribution of stresses the role of communications and integration of telecommunications and computers, softwares, storage, audio-visual, that enable users to access, store, transmit, and manipulate information. ICT is an umbrella term that includes any communication device, encompassing radio, television, cell phones, computer and network hardware, satellite systems and so on, as well as the various services and appliances with them such as video conferencing and distance learning. ICT covers any product that will store, retrieve, manipulate, transmit, or receive information electronically in a digital form (*e.g.,* personal computers, digital television, email, or robots).

For the purpose of understanding, let us limit the perception of ICT as a combination of use of specific soft wares in the analysis of field data, their presentation using graphics and finally their interpretation using a combination of the analysed data and the theory behind the practical aspect linked with communication through the internet.

Consider teaching students the use of groundwater for irrigation in Farm Management course.

It is crucial to note that in this class students are taught about the role of groundwater in agriculture, in irrigation, profitability, wise use, sustainable use and implications of over exploitation. Unless the students are also taught the aftermath of unsustainable extraction due to over pumping of groundwater for the cultivation of crops like paddy, which uses around 5000 litres of water per kilo of paddy, students will not be able to understand and appreciate the need for sustainable use of groundwater. Most students as farmers will think, groundwater will flow when ever switch is put on!

Since this is class is in the ambit of agricultural economics and resource economics, the students need to be taught 1. Costing groundwater for irrigation 2. Computing profitability of crops by adding groundwater cost to the cost of cultivation, 3. Implications of over exploitation of groundwater. These require a combination of use of Micro soft Excel (to teach the students the costing of different components of groundwater irrigation such as cost of drilling and casing well, cost of pump set, the differences between fixed and variable costs, and finally the cost of irrigation water), then using internet, convey what are the results of the GRACE satellite imagery https://gpm.nasa.gov/education/sites/default/files/videos/Indias%20Water%201.mp4 (is a 30 seconds video) which reflects how the groundwater in Punjab and Haryana are being over exploited due to cultivation of rice, wheat by pumping groundwater, and how the NASA scientist is explaining the phenomenon a one minute 17 seconds video https://gpm.nasa.gov/education/sites/default/files/videos/Indias%20Water%203.mp4 highlighting the explanation behind the groundwater over exploitation video.

In the above example, we are appreciating (1) the need for a teacher to integrate his/her skills of teaching the subject matter (theory) in explaining that cost of groundwater is not merely the cost of electricity used in pumping groundwater, but it also includes cost of initial well failure, premature well failure, in the form of negative externality due to cumulative interference of irrigation wells, violation of isolation distance, the difference between the life and age of well, the difference between fixed cost and variable cost of groundwater irrigation, how the externality is computed, with (2) the practical aspect of using MS Excel software to compute the comprehensive cost of groundwater used for irrigation and finally the use of (3) GRACE satellite pictures of NASA which clearly show how groundwater is undergoing fast depletion in Punjab and Haryana as case studies to emphasize that similar phenomenon can occur in any part of India, since despite having five flowing rivers in Punjab, Punjab is depleted more than 90 percent.

Conclusion

The ICT based e resource is crucial for students to understand, perceive, conceive and appreciate concepts used in different branches of agriculture and needs to be used to complement the teaching efforts. They can never substitute the teacher in class room and field situations.