

ACTION RESEARCH – A PROFESSIONAL DEVELOPMENT APPROACH FOR STUDENTS AND TEACHERS



Agricultural extension professionals lag behind in conducting innovative research and generating new knowledge, mainly because of their dependence on conventional research methods. In this blog, Dr Sagar Wadkar, Prof. Birendra Kumar, and Dr P Sethuraman Sivakumar highlight the need for

promoting action research in extension –as a process to build the empirically-based research capacity of students and teachers– along with a strategy to create and maintain positive social, economic and environmental change.

INTRODUCTION

Changing the context of research – what is and what ought to be

Farmers in developing countries face several new challenges. These include dealing with uncertain markets and weather, declining land and water availability and their deterioration, and increasing cost of inputs compared to declining income from farming. Extension professionals need to be more realistic and technically competent to address many of these issues. Extension professionals need an empathetic lens to see and understand the target clientele/community better. They should have the ability to analyse a particular issue or field situation from a historical, political, socio-cultural and economic point of view. However, the existing curricula in general and research methodology courses in particular, offer a theoretical orientation for doing research. We need pragmatic orientation to develop this competency for understanding communities, their dynamics and environment.

The extension research was initiated under the influence of a diffusionist approach with emphasis on ‘why don’t’ they adopt innovation, and ‘who’ adopts and ‘why’, finding the critical variables that fuelled transfer of technology approach. However, the Master’s and Doctoral researches in extension are discipline-focused, oriented towards knowledge acquisition in aspects related to extension rather than skills development and field application/intervention. Research methodology courses currently orient extension students on scientific ways of conducting research. They are taught scientific methods of problem formulation, collecting data, analysing it and reporting. Accordingly, they do research, collect data and analyse it in ways that enable them to describe situations as they exist and/or report impact of any intervention, package of practices, etc., and come up with a ‘list of recommendations’ for others to implement. This process develops their competency in doing research, but they cannot change field situations and thus produce reports that have minimal application in the field. Adversely it also does not set them apart from other students doing similar academic studies. Sivakumar and Sulaiman (2015) observed that currently extension research in India is not providing any substantiative input for extension policy or in generating good practice of extension. Due to lack of practical significance and stagnation in theory development, extension research is often criticized by other agricultural disciplines as a ‘non-performing discipline’ (Sivakumar 2015).

Therefore for universities to be more consistent with stated institutional mandates, which emphasise problem solving for communities and national development, empirical research needs to be balanced through the integration of more development-oriented and participatory action research that enable them to generate empirical data, which further can be used to solve farmers’ problems.

The committee on doubling farmers' income (MoA&FW 2017) has also suggested identifying the location-specific problems of farmers, and accordingly the research priorities of post-graduate and doctoral scholars must be guided. Thus, there is a need for application of action-oriented methodologies to make extension research more field-oriented, problem-focused and ethically satisfying.

Action research

Action Research (AR) is a process of action inquiry that follows a cycle in which one improves practice by systematically oscillating between taking actions in the field of practice, and inquiring into it. The basic action inquiry cycle is about planning for improvement in the practice, acting to implement the planned improvement, monitoring and describing the effects of the action, and then evaluating the outcomes of the action (Tripp 2005). Thus, it is carried out for people, with people and by people, and begins with a systematic investigation of the problem in order to formulate the right questions based on interactions with stakeholders. Unlike academic research, it calls for more engagement with the field. Action is designed to solve problems being faced, and research verifies the efficacy of the action.

It is often considered as social research for social change,¹ which demonstrates working towards a resolution of the impetus for action with the reflective process of inquiry and knowledge generation, so as to generate new practices (Somekh and Zeichner 2009). A more succinct definition of AR is:

"...aims to contribute both to the practical concerns of people in an immediate problematic situation and to further the goals of social science simultaneously. Thus, there is a dual commitment in action research to study a system and concurrently to collaborate with members of the system in changing it in what is together regarded as a desirable direction. Accomplishing this twin goal requires the active collaboration of researcher and farmers, and thus it stresses the importance of co-learning as a primary aspect of the research process." (Thomas et al. 1986).

This approach was found to be effective in helping and empowering farmers, especially when educational institutions, non-governmental organisations, and farmers work together.² Kurt Lewin, who first pioneered the action research concept (Box 1), viewed it as a cyclical, dynamic, and collaborative process; and since then action research and its variations have been adopted in a variety of disciplines, including education, psychology, community health sciences, and more recently in rural development.

Box 1. Origin of action research

As per evolution, four main streams emerged— traditional, contextual, radical, and educational action research (O'Brien 2001).

- **Kurt Lewin³ and Traditional Action Research**

A German social and experimental psychologist, Lewin coined the term AR⁴ and characterized AR as an alternative to the norms of decontextualized research. Instead of focusing on surveys and statistical methods, action research's purpose is to improve social formations by involving participants in a cyclical process of fact finding, planning, exploratory action, and evaluation. Lewin has introduced four types of AR – *Diagnostic* (to identify a problem and help generate proposed solutions that would be acceptable to those involved in an existing problem situation (people involved in this AR may not themselves be

¹Greenwood and Levin. (1998.) *Introduction to action research: Social research for social change*. London: Sage.

²Suvedi M and Ghimire RP. (2016.) In search of an alternative agricultural extension strategy: An action research on off-season vegetable production in Nepal. *Journal of International Agricultural and Extension Education* 23(2):50-62.

³Lewin K. (1948.) *Resolving social conflicts: Selected papers on group dynamics*. Ed. Gertrude W. Lewin. New York: Harper & Row.

⁴Lewin K. (1946.) Action research and minority problems. *Journal of Social Issues* 2(4):34-36.

directly affected by the problem); *Participant* (those affected by a problem are involved from the beginning in finding a solution. This type of AR, tends to have only limited local application and limited generalizability); *Empirical* (involves accumulating and recording day-to-day lived experiences within groups in order to build generalizable knowledge); and *Experimental* (using controls to test hypotheses in quasi-experimental conditions. Of all the varieties of AR, this AR has the greatest potential for the advancement of scientific knowledge; however, it is the most difficult form of AR to carry out successfully). Further he conceptualized all kinds of social change as a three-step process: preliminary diagnosis & data gathering (unfreezing) → action planning and co-learning (changing) → integration of desired condition in existing structure (refreezing).

- **Eric Trist⁵ and Contextual Action Research**

A social psychiatrist engaged in applied social research, Trist tended to focus more on large-scale, multi-organizational problems, which led to the founding of contextual action research, also referred to as 'action learning'. It entails reconstituting the structural relations among actors in a social environment, where all concerned parties and stakeholders participate so as to understand the working of the whole.

- **Paulo Freire⁶ and Radical Action Research**

Freire, a Brazilian educator and philosopher, pioneered the Participatory Action Research (PAR) methodology, a subset of radical action research, which has a strong focus on emancipation and the overcoming of power imbalances. This method grew out of his critical pedagogy and emancipating theology ideas. He further emphasized the significance of critical consciousness for social change, where oppressed groups can take up their own action for their self-upliftment. The two branches of this school are PAR and Feminist Action Research.

- **John Dewey⁷ and Educational Action Research**

An American educational philosopher, John Dewey believed that development practitioners, and professional educators, should engage in solving community problems by professional development, curriculum development, empowerment and action learning. Dewey's problem solving model (known as reflective thinking) is popular and he affirms that in practice, educational action research influences the quality enhancement of teaching and learning. This evolved into the living theory approach – to justify the practitioners' educational influences in their own learning by asking "How am I improving what I am doing?" (Whitehead 1989; McNiff 2002).

How is it different from traditional research?

AR emphasises problem solving through 'learning by doing'. It focuses on practice of enquiry through concurrent activities. But it is not simply a problem-solving activity. There is dual commitment in action research – to study a system and concurrently to collaborate with members of the system in changing it, in what is together regarded as a desirable direction. Several attributes separate action research from other types of research. Firstly, it focuses on turning the people involved into researchers too. Secondly, it has a social dimension. The research takes place in real world situations and aims to solve real problems. Thirdly, the initiating researchers make no attempt to remain objective, but openly acknowledge their bias to the other participants. Owing to these attributes and other principles it is not possible to place action research in a positive paradigm, especially since the paradigm is based on objective reality and relies heavily on quantitative measures. Action research shows a number of perspectives within the interpretive paradigm. Though this paradigm relies on qualitative measurement, it still retains the ideals of researcher objectivity and researcher as passive collector and expert interpreter of data. Therefore, it is also not the right paradigm for action research. Affiliation of action research lies with the paradigm of praxis. Praxis is the art of working upon the conditions one faces in order to change them. Knowledge is derived from practice and practice informed by knowledge in an on-going process – this is a cornerstone of action research. It also rejects the notion of researcher neutrality, recognizing that the most active researcher is often one who has most at stake in resolving a problematic situation. Thus AR employs recognised research

⁵Trist Eric. (1977.) A concept of organizational ecology. *Australian Journal of Management* 2(2):161-75.

⁶Freire P. (1970.) *Pedagogy of the oppressed*. New York: Seabury Press.

⁷Dewey J. (1929.) *The quest for certainty: A study of the relation of knowledge and action*. New York: Minton, Balch and Company.

techniques to inform the action taken to improve practice, requires action in the fields of both practice and research, so to a greater or lesser extent, it will have characteristics of both routine practice and scientific research. The following table shows how action research stands in relation to some of the differences between these two (Table 1).

Table 1. Differences between routine practice, action research and conventional research

S. No.	Routine Practice	Action Research	Scientific Research
1	Habitual	Innovative	Original, resourced
2	Continuous	Continual	Occasional
3	Responsive, contingency driven	Pro-active, strategically driven	Methodologically driven
4	Individual	Participatory	Collaborative/Collegial
5	Naturalistic	Interventionist	Experimental
6	Unexamined	Problematized	Commissioned
7	Experienced	Deliberative	Argued
8	Unarticulated	Documented	Peer reviewed
9	Pragmatic	Understood	Explained/Theorised
10	Context specific		Generalised
11	Private	Disseminated	Published

(Source: Tripp 2005)

The process of action research

Extension researches are applied in nature, meaning that the findings need to be useful for changing behaviour of the clientele group. However, in reality the methods used are no different from the other social research methods except that the problems are field-oriented mostly. Inclusions of action research in education and management have the logic of relevance and applicability. It is a process to conduct research in a natural setting, and learns from the findings that go on to improve the situation. Here action and research go hand in hand. Research is conducted to solve a problem being encountered by the practitioners and then the researcher takes efforts to understand and conceptualize the problem and form hypothesis for alternatives. Then s/he takes actions systematically to solve the problem. Along the way s/he also collects data to measure the impact of the action. It is a cyclic process of action and reflection. The best part of the research is its focus on applicability of the solutions. It is so different from academic research that many academicians may refuse to accept it as research, but the relevance of the methodology may motivate them to use it to learn from everyday action and practice. Thus, it deals with two things: action (what you do) and research (how you learn about and explain what you do). The action aspect of action research is about improving practice. The research aspect is about creating knowledge about practice. The knowledge created is your knowledge of your practice (McNiff and Whitehead 2010). A few examples of conventional extension research questions and action research questions are displayed in Table 2.

However, action research is very challenging and difficult to do. Normally academics accustomed to conventional data-based research may find the whole exercise unpalatable and unresearch-like due to the uncertainties regarding conceiving, conducting, reporting and publishing such research.

Table 2. Differences in conventional and action research questions

S. No	Conventional extension research	Action research
1	What is the relationship between adaptor characteristics and adoption of improved technology?	How do I influence the farmers so that they adopt the improved technology?
2	Does the leadership style influence the extension worker's productivity?	How do I improve the leadership style of extension managers so as to improve worker productivity?
3	Does the extension intervention (FLD, etc.) improve the farm income?	How can I increase the farm income by implementing a specific extension intervention?

Various scholars have explained action research as emancipatory research, collaborative inquiry, and action inquiry, but all are variations on a theme. There are many models and guidelines for engaging in the action research methodology (Box 2). Some of the different developments of the basic action inquiry process include: action research (Lewin 1946), action learning (Revons 1971), reflective practice (Schon 1983), action design (Argrys 1985), experiential learning (Kolb 1984), the PDCA cycle (Deming 1986), PLA, PAR, PAD, PALM, PRA,⁸ etc. (Chambers 1983), deliberative practice (McCutcheon 1988), praxis research (Whyte 1964; 1991), appreciative inquiry (Cooperrider and Shrevasteva 1987), diagnostic practice (generic in medicine, remedial teaching, etc.), action evaluation (Rothman and Dosik 1999), soft systems methodology (Checkland and Holwell 1998), transformational learning (Marquardt 1999), as a helix (Stringer 2008), and e 'learning by doing' (O'Brien 1998). These models are developed and customized to particular uses, practices, participants, and situations, which have different outcomes that are likely to be reported in different ways to various audiences.

Box 2. Models of Action Research

Various models that can be used to conduct action research. These are as follows:

- Stephen Kemmis (1982): a basic model - plan, action, observe, and reflect;
- Gerald Susman (1983): a circular model - diagnose, action plan, take action, evaluate, and specify learning;
- Eric Trist and Fred Emery (1959): a search conference – collaborative group model – pre-conference, group work 1 (scanning the issue), group work 2 (desired future), group work 3 (options for change), presentation plenary after each group work and post conference;
- Mertler and Charles (2011): a cyclical and iterative model -
 - ⇒ *Planning stage*: Identifying and limiting the topic; gathering information; reviewing related literature; developing a research plan;
 - ⇒ *Acting stage*: Collecting data; analysing data;
 - ⇒ *Developing stage*: Developing an action plan;
 - ⇒ *Reflecting stage*: sharing and communicating results; reflecting on the process.

Role of the action researcher

The role of a researcher in action research is to produce a mutually agreeable outcome for all participants. To accomplish this he may play different roles at various stages of the process. These are planner, leader, catalyser, facilitator, teacher, designer, listener, observer, synthesizer and reporter.

⁸PLA: Participatory Learning and Action; PAR: Participatory Action Research; PAD: Participatory Action Development; PALM: Participatory Learning Methods; PRA: Participatory Rural Appraisal.

The main role, however, is to nurture local leaders to the point where they can take responsibility for the process. In many action research situations, the researchers' role is primarily to take the time to facilitate dialogue and foster reflective analysis among the participants, provide them with periodic reports, and write a final report when the researchers' involvement has ended.

Implication of AR in agriculture and rural development

It is a well-recognised fact that there is weak coordination and linkage between research, education, extension, and farmers. Extension researchers are not aware of field challenges and problems, therefore their research lacks in relevance, offers limited information and very little knowledge sharing between stakeholders. On the other hand, (participatory) action research enables bridging of these gaps and collaborates with farmers in key activities including technology selection, dissemination, evaluation (Case Study 1), value-chain analysis (Case Study 2), and convergence of schemes and programmes for its effective implementation (Case Study 3), thereby breaking the traditional one-way relationship and fostering shared visions and actions among stakeholders.

Case Studies

1. Linking research institute with post offices for dissemination of agricultural technologies: An action research project

The aim of this action research project conducted by the Indian Agricultural Research Institute (IARI), New Delhi, was to establish linkage with Post Offices for dissemination of agricultural technology and package of practices. In the first phase of the study, an exploratory and descriptive study was conducted on the possibility of establishing linkages with post office in dissemination of IARI technology. During the course of this process the post offices and their personnel at district, block, and villages levels in Sitapur district of Uttar Pradesh were contacted, and the trends in post office workings in the last 10 years was assessed. In Phase 2, suitable crops and their varieties were identified and disseminated through the postal network; then performance was assessed. Performance of these crops was assessed in terms of area coverage, yield obtained, total quality of produce generated for further use, and their economics for high volume-high value and low volume-high value crops. Post office personnel's and farmers' perceptions (n=200) were ascertained and correlated to see the degree of convergence. As a result, the AR team including post office personnel, conclusively decided to disseminate IARI's quality seed and related package of practices through Post Offices.

In 2011–12 *Rabi* season, 1014 farmers under seven post offices in two blocks, namely *Sidhauli* and *Kasmanda*, covering 30 villages were reached through this approach. It was observed that more than 90% of the farmers received the seed of wheat, paddy, pigeonpea, *bajra* (pearl millet), mustard, bottle gourd, pumpkin, and okra crops sent through post offices within 4–6 days of despatch from IARI. At the evaluation stage, a survey was conducted with certain identified farmers to analyse their feedback regarding IARI seeds, seed despatch mechanism and related issues. The performance of IARI crop variety was found superior as compared to prevailing popular varieties. Farmers, as well as village post office personnel, found this approach very effective and a successful means for making the improved agricultural technologies available in the rural areas in fairly less time and cost. In the final stage, the capacity building of farmers and post office personnel was done so as to raise their level of agricultural knowledge; and cost sharing for high volume crops further helped to improve the sustainability dimension of this approach. This AR helped to generate a new empirical model of transfer of technology through post-offices, and helps to strengthen backward linkages with research institutes.

(Source: Dubey *et al.* 2012)

Agriculture and rural development is based on local resources, bio-physical properties, and more importantly, the capabilities of people as key resources. AR helps to utilise these local resources and capabilities and offers a practical approach to innovation and support, and facilitates change processes concerning issues of sustainability of livelihoods. These aspects are highlighted in Case Study 2 (below).

2. Improving income for walnut growers in Kishtwar, Jammu and Kashmir, through better marketing linkages and value addition at the source

Jammu and Kashmir (J&K) State contributes almost 98% of the total walnut production in India. In the state, Kishtwar district is the major contributor, and offers huge potential for high incomes to farmers. However, factors such as a large number of middlemen, lack of market information and connectivity, and low value addition at source have prevented the benefits of these endowments from reaching the actual growers of this region. Farmers lost up to 38% of their potential income in the year 2013-14.⁹ In this backdrop, action research was undertaken with the focused objective of increasing per capita income of walnut growers through effective post-harvest management. The study was divided into three major parts. In part 1 a situation analysis was carried out to understand the context and identification of the problem. This was performed by narrowing it down to the commodity—Walnuts, then value chain analysis and the opportunity therein; and finally identification of villages for which a rank-based ordinal approach was adopted, then the Panchayat with the top score was selected based on quality and quantity of walnuts, and ratio of small farmers to large farmers.

In the second stage, analysis of the existing walnut-marketing channel was assessed; walnut growers were sensitised and mobilised towards post-harvest management, their capacity built to undertake different functional roles (as monitors, harvesters, collectors, processors and transporters) for primary processing at the source, and finally the per capita gain in income was calculated and revealed, and the process documented. As a result, a village, 'Sigdi', was identified for the study. The potential of gain from the last selling prices of producers per kg was found to be 31% for shelled walnuts and 47% for kernels. Therefore it was decided to have manual cracking of walnut at household level, then at district level grading, segregation, quality inspection and packing was done, and finally transportation of packaged kernels and shelled walnut to the local and national market. All these efforts resulted in: dissolution of the information barrier, increased value due to processing, and higher offer prices in the new market. Consequently the average earning for 297 households of the village increased by 28% in addition to perceivable improvement in the status of women. The action research approach adopted by the team (growers, panchayat representatives, and district officials) and convergence displayed by the various government functionaries truly reflect the essentials of a successful intervention. This approach helps to organise farmers so as to strengthen their organizational and entrepreneurial capacities. It was also observed that in the absence of this foundational phase, farmers will not develop the necessary ability to function as genuine partners in value-chain analysis.

(Source: Sharma 2017)

Action research engages the researcher in a collective action approach and enables them to implement the programmes and schemes efficiently and thus develop new solutions that can change existing practices. They can moreover then test the feasibility and features of these new solutions, innovations, products, services, etc. (Case Study 3)

⁹District Statistical Handbook, Kishtwar, Jammu and Kashmir, 2013-14 (page 234).

3. Improving efficiency of skill development schemes: Action research in Naxal-affected Narayanpur district of Chhattisgarh

The aim of this AR was to improve the efficiency of the skill development scheme in order to provide suitable livelihood opportunities to prospective youth. This study analysed the three major skill development programs – Mukhya Mantri Kaushal Vikas Yojana, Deen Dayal Upadhyay Gramin Kaushal Yojana and; Rural Self Employment Institute– implemented in Narayanpur district under the aegis of the Chhattisgarh Skill Development Authority. The study divided into four major parts: a) Situation analysis to assess skill demand was conducted through a survey to understand the employment status in the district and demand for skill courses among the potential youth (age group of 14 - 45 years); b) Skill gap analysis to ascertain prospective employment opportunities in the district and State were mapped with the help of local administration, local employers, entrepreneurs, government officials, and upcoming industries in the district; c) Content analysis of selected schemes were carried out to understand the provisions under each scheme; and d) accordingly a perspective plan for the effective implementation of these schemes was prepared and executed. The AR team has a proactive role in all phases of the AR process, comprising District Skill Development Authority and its enabling agencies, 35 anganwadi sevikas, 52 saksharata preraks, 38 vocational training providers, 26 private employers within the district, all facilitated by a Rural Development Fellow as the Researcher. Thus it is suggested that there is need for convergence of the relevant schemes at the district level for its effective implementation. Any scheme or program should not be implemented as a standalone plan, but it should be part of a larger framework that includes education, people's development, livelihood security, employment generation and socio-economic integration of society, for its effective implementation.

(Source: Patki 2017)

Potential of AR in extension

Action research has immense potential in extension. In general, most research problems in extension are complex in nature, calling for multi-disciplinary collaborative action. As extension research strives to advance knowledge, one has to master the skill while solving the problem. A few examples of action research in extension science are shown in Table 3.



(Source: <https://actionresearchplus.com/what-is-action-research/>)

Table 3. Examples of action research in extension

S. No	Research problem	Objectives of research	Type of action research	Variables	Who will conduct the research and outputs
1.	<p>The vegetable farmers are suffering from unstable market prices of seasonal vegetables. The aggregators, who collect vegetables directly from farms are exploiting the farmers by paying a lower price. The farmers' share in the consumer price is estimated at 55% despite their proximity to Delhi. There is a need to design sustainable value chain interventions in order to enhance the welfare of vegetable farmers.</p>	<p>To enhance livelihood of farmers through sustainable value chain intervention</p> <p>Steps</p> <ol style="list-style-type: none"> 1. Selection of value chain; 2. Mapping of value chain; 3. Assessment of value chain to identify intervention points; 4. Develop a competitiveness strategy; 5. Design and implement value chain interventions; 6. Monitoring and evaluation; 7. Institutionalisation – Creating Farmers' Organisations, like FPO, etc. 	<p>Participatory value chain intervention</p> <p>Mixed methods research design</p> <ul style="list-style-type: none"> • Multi-disciplinary – Economics, extension, seed technology, food technology, agronomy; • Type of user involvement – Collaboration; • Integration of research with extension work – involves creation of farmers' groups/ FPOs, demonstration of technology, training of stakeholders, farmers' seminars/workshops, market linkage, and entrepreneurship development. 	<ul style="list-style-type: none"> • Variables - Marketing channels, market-related operations, value chain actors and processes, interconnections and flows, current technologies and problems, profit at each level, price spread, share in consumer rupee, interventions, entrepreneurship orientation of farmers, entrepreneurial eco-system; • Methods – PRA, focus groups, market survey, document analysis, participatory observations; • Major statistical tools – network analysis; regression. 	<p>Who</p> <p>Two PhD student theses, or three to four MSc theses, by splitting the research components.</p> <p>Outputs</p> <ul style="list-style-type: none"> • Research papers in quality peer-reviewed journals; • Development of an extension model with reasonable replicability; • Improving adoption of University-developed technologies; • Suggestions to University to modify existing technologies or develop need-based technologies; • Demonstrating the University's role in socio-economic development of the population it serves.

S. No.	Research problem	Objectives of research	Type of action research	Variables	Who will conduct the research and outputs
2.	The state government has announced a programme on peri-urban agriculture with a focus on promoting home gardening in cities. The idea was to increase the availability of safe and nutritious vegetables in cities while maximising the green cover to combat pollution. As a part of the programme, the University is designing a distance education course on vegetable-based home gardening, targeted towards housewives and retired people in urban areas. The course will be delivered through the existing distance education system of the University. The extension department is tasked with designing the educational management approach for the specific course.	<p>To develop a course management model to provide quality learning experiences</p> <p>Approach Development of an integrated learner-centred model for course improvement, tutor development, course management strategies and infrastructure evolution.</p> <p>Models 1. Educational Management Action Research model (McPherson & Nunes 2002) 2. Educational Systems Design Framework (Nunes 1999)</p>	<p>Distance Education Management Action Research Mixed methods research design -</p> <ul style="list-style-type: none"> Multi-disciplinary – Extension, Computer Science/ Engineering, Horticulture; Type of user involvement – Collaborative – implemented through a Learner Club created for study <p>Steps 1. Creation of Learner Clubs; 2. Diagnosis – Identification of learning needs and learner characteristics; 3. Action planning – Instructional design by combining pedagogical model with suitable educational setting; field testing of learning paths; 4. Action taking – Managing course delivery; 5. Action evaluation – Formative and summative evaluations on learning achievement.</p>	<ul style="list-style-type: none"> Variables - specific topics desired by learners, type of information/skill desired, preferred learning mode/ - media; learner characters – learning style (cognitive, visual, auditory, kinaesthetic and tactile);current knowledge/skill levels, education, motivation to learn; feasibility studies of home gardening at their place; availability and access to seeds and other inputs (customised to home garden needs); tutor selection and training, learning paths; learner feedback Methods – Participatory workshops with learners and tutors; participant observations; focus groups discussion; experiment (to assess user learning with different learning paths/ designs) 	<p>Who Two PhD student theses or three to four MSc theses, by splitting the research components.</p> <p>Outputs</p> <ul style="list-style-type: none"> Research papers in quality peer-reviewed journals in computer based learning or distance education; Development of a distance model with reasonable replicability; Improving adoption of University-developed vegetable technologies and systems; Demonstrating the University's role in socio-economic development of the population it serves.

A few research papers on action research

The following research papers examined action research approaches on various aspects related to agriculture; and then were published in highly-rated and peer-reviewed international journals.

Distance education

- Nunes JMB and McPherson MA. (2003.) An action research model for the management of change in continuing professional distance education. *Innovations in Teaching and Learning in Information and Computer Sciences (ITALICS)*, 2(1). (Citescore2017- 0.27).
- McPherson MA and Nunes JMB.(2002.) Supporting educational management through action research. *The International Journal of Educational Management* 16(6):300-308. (CiteScore 2017:1.16).
- Forster Mand Washington E. (2000.) A model for developing and managing distance education programs using interactive video technology. *Journal of Social Work Education* 36(1):147-158. (Thompson Reuters Impact Factor: 1.000).
- Nunes JMB and McPherson MA. (2003.) Action research in continuing professional development. *Journal of Computer Assisted Learning* 19:429–437. (Thompson Reuters Impact Factor:1.859)

Value chain analysis and intervention

- Murshed-e-Jahan K, Ali H, Upraity V, and Gurung S. (2018.) Making sense of the market: Assessing the participatory market chain approach to aquaculture value chain development in Nepal and Bangladesh. *Aquaculture* 493(1):395-405. (Thompson Reuters Impact Factor: 2.710; Cite Score: 3.05)
- Thiele G, Devaux A, Reinoso H, Pico H, Montesdeoca F, Pumisacho M, Andrade-Piedra J, Velasco C, Flores P, Esprella R, Thomann A, Manrique K and Horton D. (2011.) Multi-stakeholder platforms for linking small farmers to value chains: evidence from the Andes. *International Journal of Agricultural Sustainability* 9(3):423-433. (Thompson Reuters Impact Factor: 2.702)
- Lie Helene, Rich Karl M, Burkart Stefan. (2017.) Participatory system dynamics modelling for dairy value chain development in Nicaragua. *Development in Practice* 27(6):785-800. (RG Journal Impact: 0.75).

Climate change and vulnerability

- Bryant CR, Chahine G. (2015.) Action research and reducing the vulnerability of peri-urban agriculture: a case study from the Montreal Region. *Geographical Research* 54(2):165–175. (Thompson Reuters Impact Factor: 1.343)
- Bele MY, Sonwa DJ, and Tiani AM. (2013.) Profiling climate change vulnerability and adaptive capacity of local communities in Bukavu, DR Congo. *The Journal of Environment Development* 23:331-357. (Thompson Reuters Impact Factor: 2.313)
- Mapfumo P, Nsiah-Adjei S, Mtambanengwe F, Chikowo R, and Giller KE. (2013.) Participatory Action Research (PAR) as an entry point for supporting climate change adaptation by small holder farmers. *Environment and Development* 5:6-22. (Thompson Reuters Impact Factor: 2.334)

End Note

Putting people at the centre of development is the key to sustainable development. In a changing development scenario, extension professionals need to be competent in both technical areas of their field as well as in process skills. Farmers' problems are multi-dimensional, it demands multi-disciplinary research and convergence of all relevant stakeholders (currently missing in most

extension researches), whereas action research encourages agricultural stakeholders to keep an eye on changes and modify their approach and programs to suit the changing contexts.

However, currently MSc and PhD research is limited by institutional mandates and protocols with a pre-determined approach, which needs to be reviewed if action research is to be encouraged. Action research provides a unique opportunity for students to look at how participatory methods can be translated from theory into practice, how they become institutionalized, and its impact on diverse farming communities. The knowledge gained and generated in the process helps academicians, extension professionals and development practitioners to enhance theoretical understanding of how increasing peoples' participation leads to increased empowerment and decision-making. Further, this process of participation brings change in people and nurture a sense of belonging and ownership towards developmental efforts, thereby leading to sustainability of the intervention undertaken. The students with these new skill sets are expected to become development facilitators and/or managers of rural innovation, who can simplify complex development processes. We should encourage extension researchers, especially PhD scholars, to undertake action research on contemporary issues– this change may call for the capacity building of faculty inaction research methodology.

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