Available online at http://www.journalcra.com

International Journal of Current Research
Vol. 7, Issue, 12, pp.24485-24489, December, 2015

INTERNATIONAL JOURNAL OF CURRENT RESEARCH

ISSN: 0975-833X

RESEARCH ARTICLE

MASS SCALE TRAINING OF SMALLHOLDER FARMERS: CAN VIDEO TEACHING BE A SUBSTITUTE TO METHOD DEMONSTRATION? AN EXPERIMENTAL STUDY ON KNOWLEDGE TRANSFER IN SOUTH INDIAN VILLAGES

***Dr. Kolandavel Natarajan**

Agriculture Extension, Dept of Agriculture Extension and Rural Development, Wolaita Sodo University, Ethiopia

ARTICLE INFO

Article History:
Received 25th September, 2015
Received in revised form
20th October, 2015
Accepted 07th November, 2015
Published online 30th December, 2015

Key words:
Agriculture Extension Education,
Extension Training,
Training Effectiveness,
Video Teaching,
Method Demonstration,
Experimental Design,
Randomized Block Design,
Smallholder farmer Training.

ABSTRACT

Agriculture development in developing countries hinges on the sustained adoption of improved agriculture practices evolved by agriculture research system. The agriculture extension agencies across the world act as a bridge between the agriculture research system and farming community facilitating the flow of information between them. Farmers' training is an important component of transfer of technology. Extension workers are required to choose training methods to reach out to geographically dispersed smallholder farmers in short period of time in a cost efficient manner without compromising on the training effectiveness. Method Demonstration has been an important training method used to transfer knowledge and skill to farmers in India and other developing countries. In spite of its proven effectiveness the manual intensive group teaching process involved in the Method Demonstration limits it potential to transfer knowledge to mass of smallholders in short period of time, especially before planting season to quickly transfer agriculture innovation for mass adoption. An experimental study was conducted in South Indian villages to test the suitability of Video Teaching as an alternative to Method Demonstration to convey the agriculture message as effectively as Method Demonstration. Given its amenability to duplicate the content and play the content in multitude of places across geographies, Video Teaching might be an alternative, provided its effectiveness is tested empirically. The research study used the sophisticated Randomized Block Experimental Design to compare the effectiveness of Video Teaching and Method Demonstration in effecting Knowledge Gain among the subjects (farmers). The results showed that Video Teaching is comparable with Method Demonstration, implying that it can be used to transfer knowledge across geographies. Treatments exposed to the subjects had the rank order of effectiveness as: Video Teaching + Method Demonstration, Method Demonstration and Video Teaching in terms of Knowledge Gain.

Citation: **Dr. Kolandavel Natarajan, 2015.** "Mass scale training of smallholder farmers: can video teaching be a substitute to method demonstration? An experimental study on knowledge transfer in south Indian villages", *International Journal of Current Research,* 7, (12), 24485-24489.

INTRODUCTION

In the era of agriculture innovation explosion, dissemination of scientific knowledge to smallholder farmers has been an eternal challenge. Technical advances are taking place with such a rapid strides that farmers and extension workers find it difficult to keep pace with them. This has resulted in an uneven growth and development. Modern agriculture technology is sophisticated, precise, dynamic and situation-specific, thereby rendering the task of those connected with agriculture all the more challenging.

This necessitates the importance of training farmers to increase the farm productivity. Effective training method to transfer innovative knowledge among farmers is the key challenge for the extension organizations across developing world. Trainer has an important role to play towards the success of farmers' training. He/she has to properly design the training programme, select appropriate training method and evaluate the training to see the extent to which the training objectives have been met and to identify areas for improvement. Among the extension methods, it is well established that Method Demonstration is the most effective means of knowledge and skill transfer to farmers. Nevertheless, Method Demonstration is a group method of training and mass coverage of farmers in short period of time to transfer knowledge/skill in short period of time, say just prior to sowing season of a rain-fed crop, for example, for mass adoption of technology across wide

Corresponding author: Dr. Kolandavel Natarajan,
Associate Professor, Agriculture Extension, Dept of Agriculture Extension and Rural Development, Wolaita Sodo University, Ethiopia.

geographical area and diverse smallholder farmers is a huge challenge. Number of farmers served by an extension worker India is dismal 5000 in India while it is 475 in some African countries and 675 in China. This explains the limitation of Method Demonstration, being a manual-intensive method, in imparting knowledge /skill among vast peasantry on a mass scale is impracticable.

There is a need for finding suitable alternatives(s) to Method Demonstration. Video has already become a popular group method of training which can potentially impart knowledge to farmers in a big way. The video programmes can be duplicated cost effectively and played across wider geographies with ease. However, the potential of Video Teaching to transfer knowledge in comparison with Method Demonstration needs scientific investigation to use the former in place of the later for mass innovation communication. The present study aims to empirically compare the effectiveness of Video Teaching to deliver the "How-to-do' knowledge vis a vis Method Demonstration through field experiments in select villages of India involving farmers as subjects. The specific objective of the study was: *To find out the relative effectiveness of Video Teaching and Method Demonstration individually as well as in their combinations experimentally in terms of Knowledge gain among farmers (subjects)*

MATEIALS AND METHODS

The scientific method of analysing the effectiveness of the training methods under consideration necessitated the researcher to manipulate some variables. Therefore the Experimental Research Design was adopted in place of usual *expost-facto* research adopted for social research in general. Among the experimental designs, the sophisticated one namely Randomized Block Design (RBD) was followed for the experiment.

Selection of Subject Matter Content (Innovation)

Rain-fed groundnut, a major crop in the study area is cultivated mainly by smallholder farmers. The crop technology was purposively selected for using it as innovation message. A list of rain-fed groundnut technologies was prepared and was given to 30 judges consisting of 10 scientists, 10 extension workers and 10 farmers asking them to rate the technologies in three–point continuum with respect to their importance to enhance groundnut yield. The responses were analysed to come out with a handful of most important technologies. Of these technologies, 'Preparation of Enriched Farm Yard Manure (FYM)' was chosen to be used in the experiment based on its newness, importance, the skill involved in its preparation and its suitability to test all the training methods under consideration.

Operational Definition

Enriched Farm Yard Manure (FYM) refers to farm yard manure blended with right quantity of super phosphate allowed for a month's time before its application to the crop field. It increases the availability of phosphorous to the rain-fed crop enabling it to have better root growth thereby making the crop efficiently use the available moisture.

Locale of Study and its Description

Selection of District

Erode district of Tamil Nadu in South India was selected for the study since it was the operating area of the Tamilnadu Agriculture University, where the researcher was working at the time of the study. The researcher was familiar with the area and the clientele system. Besides, the area under groundnut crop in the area in the district was high as 40000 hectares spread over varying irrigation systems representing an ideal setting for the conduct of the experiment.

Locale of the study Selection of *Taluk* –the Agriculture Administrative Unit

Enriched FYM is technology meant for rain-fed groundnut, a *taluk* in the selected district with highest area under rain-fed groundnut crop was selected for the study. Accordingly, *Perundurai taluk* became the choice for the experiment. Seventy per cent of the crop cultivated in the *taluk* is under rain-fed area while major soil type of the *taluk* being red soil (82 per cent) suitable for groundnut cultivation. Majority of the farmers in the *taluk* were smallholder farmers. The cropping pattern followed in the *taluk* was: Groundnut- Fodder Sorghum-Fallow.

Selection of Blocks and villages

Kunnathur block and *Oothukuli* block located in the two extremes of *Perundurai taluk* were taken up to have a fair representation of different microclimates and cultural practices adopted to conduct the experiments in consultation with the officials of the State Department of Agriculture keeping in mind the physical facilities available, distribution of groundnut crop growers in different socio-economic strata. The six villages in the blocks chosen were: *Valayapalayam, Netichipalayam and Kangiyam Palayam*.

Standardizing the Subject Matter Content

The subject matter content delivered through two training methods was made identical as follows: Method Demonstration of preparation of enriched FYM, following the university standardized procedure, was enacted by a selected extension demonstrator. The same was video-graphed to prepare the Video Teaching material by the University Video Unit. At each / combination of treatment(s) during the experiment, the same extension demonstrator was involved in demonstrating the method and the same video was played before the experimental subjects (farmers). Further, the video programme and method demonstration were subjected to standardization before a group of judges from the faculty of extension. The above programmes were played/ demonstrated before them one by one to get their judgements on the equality of contents of the methods with respect to subject matter coverage, sequence of presentation and clarity (both audio and visual). Necessary alterations were made in the method(s) based on the suggestions received from the judges.

Dependent Variable: Knowledge Gain

In this study, the dependent variable - Knowledge Gain – was taken as parameter to measure the effectiveness of Video

Teaching and Method Demonstration. Knowledge was defined as the totality of understood information possessed by an individual and it represented his/her cognitive domain. Knowledge was operationalized in this study as the quantum of scientific information known to the experimental subjects regarding the practice, "preparation of Enriched FYM". Knowledge Gain was operationalized as the quantum of information or message newly learnt by subjects (farmers) due to the demonstration of preparation of enriched FYM.

The Measuring Scale

Knowledge questions were framed from the message given through the training methods in the form of commentary (i.e. the script). Totally seventeen knowledge-related questions were subjected to scientific standardization procedure through Difficulty and Discrimination Indices prepared based on pilot testing among 30 farmers to arrive at final questions.

Validity of knowledge Scale: Point Biserial Correlation

The power and relevance of an item and its consistency with total score in the test was assessed by correlation between the item score and whole test score. Since the items were scored simply ' 1 ' for correct answer and '0' for incorrect answer, Point Biserial correlation co-efficient was calculated to measure the validity of the items chosen based on two indices: Difficulty Index and Discrimination Index. The Point Biserial correlation Co-efficient was calculated as follows:

$$r\,pb = \frac{Mp - Mq}{\sigma} X\ \sqrt{pq}$$

Where:

rpb = Point Biserial Correlation
Mp = The mean of the total score of respondents who gave correct answers to the item
Mq = The mean of the total score of respondents who gave incorrect answers to the item
σ = Standard Deviation of entire sample
p = proportion of respondents giving correct answer to the item
q = proportion of respondents giving incorrect answer to the item

Significance of Point Biserial correlation was tested with the help of table "r' value for (N-2) degrees of freedom. As the correlation for all the items are provisionally qualified to be included in the final test, the conformation of significance of 'r' value was verified using't' test.

Test of Significance of 'r' by't' test

The formula used for Point Biserial correlation co-efficient to know the item validity does not perfectly represent 'r' or 'rho' and hence it is not always possible to obtain r values ranging between -1.0 and +1.0 . These values occur when p and q are equal to 0.50. The significance of the results was tested by using the formula.

$$t = \text{rpb}\sqrt{N-2} \div \sqrt{1 - r2pb}$$

Where,

t = test of significance
rpb = Point Biserial correlation of the item
N= Sample size

The't' value was tested at (N-2) degrees of freedom and it was considered significant when its value is greater than table value.

Final selection of items

Of the 17 items taken for analysis, 15 items were picked up through series of analyses as above to construct the final knowledge test. The criteria followed for final selection of items are as under:

- Item which had Difficult Index ranging from 0.25 to 0.75
- Discrimination Index of above 0.25
- Item with significant Point Biserial correlation co-efficient

The significance of Point Biserial correlation co-efficient was confirmed through't' test.

Measurement of Knowledge Gain

The set of selected questions were administered to the experimental subjects before and after the application of the treatment on the subjects. The difference between the pre-and-post exposure scores was taken as the Knowledge Gain, which represented the Dependent Variable. The knowledge gain of different groups were statistically analysed to compare the effectiveness of the training methods used in the treatments. The possible range of knowledge gain score was between zero and fifteen.

Research Design

Experimental design was chosen for the study since it is the only research design which would enable the researcher to maximise the experimental variance, control the extraneous variance and minimize error variance and ultimately to establish the cause-effect relationship between the treatments (training methods) and knowledge gain. Randomized Block design (RDB) was adopted for the present experiment as it could satisfy all the principles of experimental design namely – Replication, Randomization and Local Control. The design could be otherwise called a Matched Group Design. It was based on the principle that the experimental unit (or subjects) could form a block or group. As a matter of fact, a group of subjects said to be homogeneous with respect to the matching variables forms a block. It was expected that each block of subjects would be equivalent in the absence of experimental treatment than subjects selected at random. Owing to this reason, Randomized Block Design was preferred to Randomized Group design. In this design, all subjects were first tested on a common or pre-test measure (also called the matching variable) and then they were formed into groups (as many as needed for the experiment) on the basis of the performance on the matching variable. The groups thus formed were said to be equivalent groups. Subsequently, treatments were applied to each block /group. If these groups had equivalent means on the dependent variable before the experimental treatment was given and if a significant difference occurred after administering the experimental treatment, then the resulting difference in the dependent variable might safely be attributed to the experimental treatment.

Subject Selection and Allotment

The experimental subjects (farmers) were chosen to be homogeneous groups and then allocated to different blocks of the experiment. The chosen subjects were pretested for their prior Knowledge on the subject matter as well as for their antecedent variables like Age, Annual Income, Socio-Economic Status, Deferred Gratification, Extension Participation, Mass Media Exposure, Value Orientation, Economic Motivation, Secular Orientation, Urban Contact and Scientific Orientation. All the scores obtained under antecedent variables were converted into Z score to categorize the subjects into three categories Block I, II and III subjects. All those subjects having average Z score of less minus one (< -1) were Block I subjects. Those with -1 to + 1 score formed the Block II subjects and those with score > 1 formed the Block III subjects. The knowledge test having 15 items had a maximum score of 15 and minimum of zero. The respondents scoring a low knowledge score range of 0 - 5 were allotted to Block I subjects and others ceased to be members of any treatment. Similarly, those subjects scoring 5 - 10 score were brought under Block II, while those with 10 -15 scores formed part of Block III subjects. There were three homogeneous groups of five subjects in a block to test the three treatments, they represented one replication. Similarly, there were other two replications with similar number of subjects in each. Altogether, 45 subjects drawn from three select villages of the study area were engaged in the experiment.

Lay out of the Randomized Block Design

The general layout of the design is shown in Table 1. Thus the number of subjects available for each treatment in one replication was five. It might be noted that members forming a block were homogenous with respect to Antecedent Variables and Dependent Variable (Intra Block Homogeneity)., On the other hand , the subjects among the blocks were heterogeneous (Inter Block Heterogeneity) and this was the main feature of Randomize Block Design. Grouping of subjects as shown in the layout had taken care of the two principles of experimentation namely, Replication and Local Control. Then, in each block the experimental treatments (numbering three) were assigned at random using random table to the different experimental groups of five subjects each fulfilling the third principle, Randomization.

Treatment and Data Collection

In each Block and Replication the Treatment exposed to the subjects as per the schema as per the arrangements made in advance. At the end of the treatments, post knowledge test was administered to record the post-exposure score for the subjects under each block/replication.

Statistical tools used

The following tests were used to analyse the data:

- Percentage analysis
- Paired 't' test

RESULTS AND DISCUSSION

The effectiveness of the training methods in terms of knowledge has been studied in two dimensions. One dimension was the significance or otherwise of the Knowledge Gain as the result of exposure to the treatment. Paired 't' test was employed to establish the significance of the change. Table 2 shows that the treatments had significantly increased the knowledge level of the subjects. The Mean Knowledge Gain scores so obtained by the subjects (farmers) revealed treatments' relative position. The results showed that the training methods viz., Video Teaching, Method Demonstration and their combination could improve the knowledge level significantly. In tune with the established theory and research findings, the combination of the methods, i.e, Video Teaching + Method Demonstration was found to have brought about the highest knowledge gain among the subjects. This finding is similar to that of Vishnoi and Sinha (1960), Choudhary and Singh (1968) who reported that combination of two teaching methods was significantly superior to single method. The significance of the variance in adjusted means arising from treatments and blocks was estimated from the Covariance analysis done in the study (Table 3). It could be seen from Table 3 that there was no variation among the three blocks with respect to effecting Knowledge Gain as evident from insignificant "F" value. Similarly, there was no interaction between Blocks and Treatments with respect to Knowledge Gain. However, the training methods / treatments had difference among them as understood from the significance F value at 5 per cent level of probability. The Critical Difference for the treatments was 2.35. In order to find out the relative effectiveness of the treatments the adjusted means were written in descending order as shown Table 4. Numerically the most effective treatment was the combination, Video + Method Demonstration. It was followed by Method Demonstration and Video Teaching in that order.

Table 1. Layout of Randomized Block Design

	Village 1 (Replication 1)	Village 2 (Replication 2)	Village 3 (Replication 3)	No. of Subjects
BLOCK I (Knowledge Score 0 - 5 & Average Z score of < -1)	Video Teaching T1	Video Teaching + Method Demonstration T3	Method Demonstration T2	15
BLOCK II (Knowledge Score 6 - 10 & Average Z score of -1 to +1)	Video Teaching + Method Demonstration T3	Method Demonstration T2	Video Teaching T1	15
BLOCK III (Knowledge Score 11-15 & Average Z score of > + 1)	Method Demonstration T2	Video Teaching T1	Video Teaching + Method Demonstration T3	15
No. of subjects	15	15	15	

Table 2. Treatments and Their Effect on Knowledge Gain among the Subjects

Treatment	Treatment	Knowledge score		Mean Knowledge Gain Score	Percent of total knowledge (out of 15) Gained	Paired 't' test value
		Pre-Treatment	Post-Treatment			
T1	Video Teaching	7.07	12.00	4.93	32.87	5.57**
T3	Method Demonstration	6.07	12.60	6.53	43.53	6.77**
T5	Video + Method Demonstration	6.47	12.80	6.33	42.20	7.15**

** Significant at .01 level of probability

Table 3. Analysis of Covariance and Its Significance (n=45)

Source of Variation	Degrees of Freedom	Sum of squares	Mean Square	SE	F Value
Block (adj)	2	8.66	4.33	3.53	1.31 NS
Treatment (adJ)	2	44.04	22.02	1.19	6.64*
Block X Treatment (adj)	4	15.96	3.99	1.17	1.21 NS
Error (adj)	83	275.25	3.32	1.17	-

*Significance at 0.05 level

Table 4. Rank Order of Treatments based on their Effectiveness on Knowledge Gain among the subjects

Treatment No	Rank in Descending order of effectiveness	Treatment	*Adjusted* Post Treatment Mean Knowledge Score
T3	I	Video Teaching + Method Demonstration	12.90
T2	II	Method Demonstration	12.73
T1	III	Video Teaching	11.90

The single method, Method Demonstration was found to be superior to Video Teaching. This might be because the knowledge component was related to the preparation of enriched FarmYard Manure, which involved skill component amenable to be imparted mainly through Method Demonstration. In addition, the direct purposeful experience given to the subjects out of the method could have improved their knowledge in a better way. Similarly, the reason for the superiority of combination of methods could be that multiple methods engage more/all the senses of the subjects enabling them to imbibe more of the subject matter being presented. Moreover, the change in the learning situation created by combination of method could have also contributed greatly to the knowledge gain.

Conclusion

The choice of training methods is the key for extension personnel to transfer the agriculture innovations across smallholder famers operating in geographically diverse and remote areas. Time and cost are the constraining factors for the extension agencies in developing countries in exercising the choice of training methods. The experimental study compared effectiveness of video teaching, a quick, replicable method with manual intensive Method Demonstration in its potential to impart knowledge to farmers. The experimental results reported in the article have amply demonstrated combination of methods is the most effective. However, given the cost and time constraint for the extension agencies in operating agrarian economies, Method Demonstration may be less preferred choice. Video Teaching is found to be effective in significant knowledge enhancement among farmers and comparable with Method Demonstration in transferring agriculture knowledge. Therefore, Video Teaching can be recommended as the cost effective substitute to Method Demonstration in imparting knowledge to farmers.

REFERENCES

Choudhary, S.V.N. and M.D.Singh 1968. Relative Effectiveness of Extension Teaching Methods. Journal Agriculture Research. 1(2): PP: 30-33.

Karthikeyan, C. 1997. An experimental study to Develop an Effective Training Module for Potential Growers for Export Oriented Cupflowers., Unpublished Ph. D Thesis, TNAU, Coimbatore, India.

Ryon, E. and Gross, N. 2010. Acceptance and Diffusion of Hybrid Corn Seed in Two Iowa Communities. Agriculture Experiment State Bulletin.

Vishnoi, S.L. and Sinha, R.R. 1960. Effectiveness of Extension Methods in Persuading Rural Youths to Adopt improved Improved Agriculture Practices and Organize Rural Youth Club. Indian Journal of Agronomy, 5(2): PP.119-25

Winzer, K. 1956. Visual Aids in agricultural Advisory work: Methods and Programeme Planning in Rural Extension. International Agriculture Study Centre, Wageningen, The Netherlands. PP.154-177

****