Effectiveness of Interactive and Traditional Training Methods

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ABSTRACT

Computer multimedia was compared with traditional approach of training sugarcane growers in ratoon management practices in three villages of Tamil Nadu state, India using pre-test post-test control group experimental design. This article also addresses issues such as perception of farmers about the two media of instruction, suggested improvements in the multimedia and the overall impact in rate of adoption. A CD-ROM was developed as a multimedia resource to support the training process. Farmers in group II who received instructions through lecture followed by computer multimedia had maximum gain in knowledge (29.10%). The learning index was also high in group II (48.65) compared to 37.55 in group I (multimedia alone) and 31.48 in group III (traditional lecture alone). 'Z' test indicated that the mean difference was highly significant in all the groups. Farmers perceived that the use of different multimedia building blocks made it an interesting and educative tool. Traditional training using lecture was considered to be boring and monotonous with limited attention span. This study is an attempt for understanding the feasibility of computer based transfer of technology in rural villages.

Key words: *Interactive multimedia; Computer based instruction; Knowledge; Perception;*

The agricultural situation in India has been in the process of change during the recent years. As a result of extensive research in sugarcane, technologies are now available which can help to boost sugarcane production in the country. However, the impact of such massive research efforts could not be fully reflected in terms of sugarcane and sugar productivity. The productivity of sugarcane in India is 70 t/ha. In most of the developing countries, it is not the lack of technology that worries, but the rate of transfer of technology from the research system to the client system. Several social science researchers had reported that farmers do not keep pace with fast developing technology (*Arulraj, 1995, Ramasamy 2004, Samaddar & Das, 2008*). Thus there is a great need for strengthening the programmes for transferring the sugarcane technologies to the farmers' fields across the country.

According to *Van den Ban and Hawkins (1996)* 'Extension involves the conscious use of communication to help people form sound opinions and make good decision'. The success of any sustainable development programme is largely determined by the level of participation of farmers (*Axinn, 1997*). To engage with farmers on a level playing field, it is crucial to take a closer look at adult education. Currently, various agricultural research and development projects use participatory approaches, such as Farmer Field Schools (FFS) and Participatory Learning and Action Research (PLAR) to engage farmers in problem design, support adult education and farmer experimentation, and allow them to draw their own conclusions (*Nederlof and Odonkor, 2006; Defoer et al., 2004*). Traditional research and extension systems view farmers as end-users who must be persuaded or otherwise cajoled into adopting research outputs, rather than as partners in the process (*Hakiza et al., 2004; Van Mele et al., 2005*).

There is widespread recognition that training is part of any information and communication technology (ICT) developmental process, but that more than just training and access to resources is required if business results are to be achieved from investment in ICT. The need for a better understanding of the process of training in the use of ICT is also widely accepted (*Caley and Hendry, 1998; Jones and Robinson, 1998*).

For the last nine decades, research activities have

been carried out at Sugarcane Breeding Institute (SBI), Coimbatore to generate new sugarcane varieties and related scientific cultivation technologies. Many of our extension activities take place at a wide range of institutions as well as at the sugar factory / village level. Our earlier attempts were on first line transfer of technology mainly through participatory mode for faster spread of technology to the farming community. Of late, computer based extension tools *viz.,* interactive multimedia module, decision support systems and interactive websites have been developed by the Institute for the benefit of the stakeholders. In this paper, we compare conventional training with the use of interactive multimedia module to promote scientific sugarcane cultivation practices.

About the interactive multimedia module: The multimedia module on sugarcane production developed by the first author describes and illustrates the several steps involved in the scientific sugarcane procedure and is in the information kiosk format targeted for sugarcane growers, extension personnel and researchers interested in the practicalities of sugarcane production technology. The module envisages the use of different multimedia building blocks such as text, audio, video, graphics and animation. The module contains detailed information from sett planting to harvest with suitable visual clippings allowing the learner to learn at his own pace of learning. Initially, the storyboard for the module was finalized based on the detailed literature on sugarcane cultivation collected. The available text matter was organized and generated as text files. Graphic elements on sugarcane production were collected and the same were scanned and generated as graphic files. Digital stills relevant to the text matter were generated and stored as graphic files. Relevant video files were created using the available CDs on sugarcane production technologies and suitable video clippings were also generated for the purpose. The module was integrated using Macromedia Flash as the authorware.

The module has three parts *viz.,* sugarcane varieties, crop production and crop protection technologies (pest, disease and nematodes). Navigation between sections was designed to be clear and supportive. Users have freedom to follow their chosen route, but there is also a clearly defined linear option. This is indicated by a 'next' and 'previous' option within sub-sections and between sections. Each section has subsections that consist of one or more text screens. Many of the text screens are supported by images and additional video clips. A voice commentary is available for the entire text matter. The module was designed to be user-friendly and runs for nearly one-hour duration.

METHODOLOGY

The study was planned and conducted using a pre-test post-test control group experimental design. The study area was three villages *viz.,* Nanjundapuram, Madathur and Varapalayam villages in Periyaanickenpalayam block of Coimbatore district of Tamil Nadu state in South India. These three villages were purposely selected because these were the adopted villages for a World Bank sponsored project implemented by us with 350 farm families as beneficiaries. Moreover, acquaintance with the locale and the cane growers therein made us choose this area. The population provided the researchers with a wide breadth and diversity of educated farmers who had sugarcane crop as their livelihood to be represented in the sample group. Fifty volunteer farmers each from the three villages were selected to be participants for the study. Absences to attend the multimedia instructional classes and inadequate computer literacy prevented few farmers from completing all phases of this experiment; thus the sample size was reduced to a total of 121 farmers from the three selected villages.

Suitable tests were developed / modified to measure the dependent variables and to record perception, personal and situational data. Data were collected using demographic schedule, teacher made knowledge test, perception schedules, participatory observation, open ended questions and focus group discussions. The main objectives of the study were to compare the effectiveness of two instructional media: computer multimedia and traditional training method through lectures and to analyze the farmers' perceptions of multimedia instruction compared to the perceptions of traditional training method.

Since sugarcane agriculture is a vast area to be dealt with, the present study was confined to ratoon crop management alone.

Sugarcane ratoon management: 'Ratooning' or 'stubble cropping' is an integral part of sugarcane

cultivation practiced in almost all the sugarcane growing countries of the world. Basically ratoon cropping implies regrowth from basal buds on the stem or crown which is situated at the surface of the ground and harvesting the aerial portion of the plant (*Sivaraman 2009*).

In India, almost 50 per cent of the cane area is always under ratoons. Cane yield decline in successive ratoons is a common phenomenon leading to low average yield of the country. The major causes for yield decline in ratoons are poor sprouting, decline in soil nutrient status, soil compaction and incidence of pests and diseases (*Sundara 2008*).

Ratoons are economical by about 25-30 per cent in the operational cost because of saving in the cost of setts and initial preparatory cultivation. A poor farmer who cannot spend on inputs for raising good ratoons still can have a 'bonus' crop to sustain himself without much investment. However, with adoption of good management practices the ratoon yield can be increased. Variety with good ratooning potential and good plant crop are the essential prerequisites for good ratoons. This has to be combined with basic ratooning operations, *viz.* stubble shaving, off-barring, gap filling, and proper crop management practices like early manuring, control of chlorosis and management of pests and diseases to get higher ratoon yields.

Benchmark surveys conducted in the study area revealed that the farmers were less aware of the scientific ratoon management practices like stubble shaving, proper harvest and maintaining cane population by gap filling. More emphasis was given on these topics through both lectures in the conventional training method as well in the interactive multimedia. Invariably, almost all the farmers adopted off barring / shoulder breaking, fertilizer application and pest and disease management measures as recommended.

For cane cultivation to be economical, the cane yield decline between a plant and ratoon crop should be less than 15 - 20%. If the yield decline is below this range, crop should not be ratooned. However, a wide yield gap was found in the study area between the plant and ratoon crop, making sugarcane cultivation less remunerative. The farmers in the study area cultivate sugarcane for jaggery making locally and hence the presence of extension workers from state department of agriculture or cane officials of sugar mills was not realized. Their counterparts who supply cane to the sugar mills are well contacted by the cane extension officials.

Conduct of the study : As an entry point, the farmers belonging to the three villages were classified into Group I, Group II and Group III. Group I received instructions through multimedia only, Group II received instructions through lecture supplemented with multimedia and Group III served as control group with instruction through lecture alone. The knowledge test (pre-test) on ratoon management was administered to the farmers of three groups. The demographic details were also collected simultaneously. A training programme with lecture mode was given to all the farmers belonging to group II and group III. The experimental group (Group I) did not attend the training – rather they were asked to work with interactive computer multimedia. The lecture based training classes were conducted in the premises of a primary school. The multimedia classes for group I was conducted in the computer club that was available in the village. Due to the limited availability of computers, the exposure was given in five batches on the same day. The farmers were given a maximum of 90 minutes to work with the computer multimedia programme. Soon after they completed going through the computer multimedia module, the respondents gave their perceptions about learning through multimedia. The farmers in group II attended the traditional lecture along with the control group (group III). The training session through lecture also lasted for 90 minutes. Here also, the respondents gave their perception of lecture method in an open ended schedule. Group II which attended the traditional lecture and had multimedia as a supplement learning tool was exposed to the computer multimedia programme within a week. After a fortnight of exposure to the varied instructional methods, post evaluation test was conducted using the same knowledge test.

Learning Index: Learning index was worked out by the formula devised for calculating the learning score (*Varghese 2010*).

$$\text{Adoption index} = \frac{\{\text{Post Training Score (\%)} - \text{Pre Training Score (\%)}\}}{\{100 - \text{Pre Training Score (\%)}\}} \times 100$$

The learning index also confirms the finding that Group II had acquired the maximum learning (48.65) through the instructions given by lecture method followed by computer multimedia.

The means were compared with null hypothesis H0: M1 = M2 Vs alternate hypothesis HA : M2 > M1 , where M1 is the mean pre-test value and M1 is the mean post-test value. The mean difference is highly significant (P < 0.001) between post and pre-test values in all the three modes of instruction which were 5.32, 8.14 and 4.88 respectively in Group I, II and III. The 'Z' test favoured the alternate hypothesis *i.e* HA: M2> M1 against H0: M1 = M2.

RESULTS AND DISCUSSION

Profile of the respondents: Demographic profile of the participants of the study indicated that they were mostly young (less than 35 years) (23.97%) to middle aged of 35-50 years (61.12%), literate with high school to graduate level (73.55%), owned at least 4.5 acres of land (66.94%) (maximum being 27 acres), 73.55% owned livestock, had high social participation (70.25%), 92.56% were married and 60.33% were living in nuclear families with a family size of five members or less. Hardly 9.09% of the total sample was females. All of them were sugarcane growers utilizing the cane for jaggery making.

Effectiveness of the different media: The knowledge test had 20 questions pertaining to ratoon management practices. Scoring of zero / one was assigned to wrong / correct responses respectively. So, the maximum total score a respondent could obtain was 20 and minimum score was zero. The percentage was worked out by dividing the score obtained by 20 and multiplied by 100.

It could be seen from Table 1 that at entry point, the respondents of all the three groups had almost the same level of knowledge. The normal practice of one plant + two ratoon crops is being followed in the area by all the farmers. Nevertheless, they follow only the traditional management practices. Observations during surveys as well as focus group discussions indicated that they were totally unaware of the recent scientific management practices and the benefits therein.

Table 1. Comparison of knowledge gain of the three modes of instruction

Knowledge level	Group I (n=38)			Group II (n=41)			Group III (n=42)		
	Mean (%)	SD	/Z/ value	Mean (%)	SD	/Z/ value	Mean (%)	SD	/Z/ value
Pre-test	43.25	18.35	5.32	40.18	14.89	8.14	40.82	18.50	4.88
Post-test	64.37	16.20		69.28	17.37		59.45	16.42	
Gain (Post test-Pre test	21.12			29.10			18.63		
Learning Index	37.55			48.65			31.48		

The results of the post-test studies indicate that the gain in knowledge ranged from 18.63 to 29.10 per cent. Among the three groups, the maximum gain in knowledge was by the farmers of Group II. This reinstates the fact that reinforcement of the same message through varied modes result in increased knowledge and thereby adoption. With regard to training situations it can be reasoned that if multimedia systems are not more, but just as effective as conventional courses, this can result in interesting efficiency gains: Courses can be made cheaper by replacing teachers or improving their productivity by improving the teacher-student ratio (*Hoogeveen 1997*).

Multimedia implies 'multisensory', 'multimodal', and 'multichannel' (*Marmolin, 1991*). Users of multimedia resources bring with them unique experiences and have differential expectations. Although these variables can never be wholly accommodated, multimedia designed for educational applications can be targeted at specific courses and structured to meet predetermined, collectively agreed objectives (*Dillon et al., 1999*). Learning experiments made clear that adding multimedia elements-if the media are used congruently, adequate use is made of mental reference models, and sufficient quality is used for information representation-improves information and knowledge transfer to people for some very specific learning tasks (*Hoogeveen 1997*).

Group I which was exposed to multimedia programme alone followed suit with 21.12 per cent

increase in knowledge level. This impact indicates the utility of multimedia as an instructional tool to the farmers.

Several people commented positively on the 'multimedia' approach, i.e. where images and sound were incorporated into the resource, stating that this approach was preferred to those that relied on text (*Tearle and Dillon 2001*). Studies (*Roden, 1991; Carlson & Falk, 1989*) have shown that superior academic performance was achieved when multimedia forms of instruction were utilized. The Comsell Company found that multimedia students move through the learning experience 30 per cent faster than in a traditional classroom (*Roden, 1991*).

Multimedia serves as a trenchant teaching tool since it facilitates more complete use of a student's senses in learning. Multimedia instructional material allows the learner to actually see, hear, and use the content learned.

The farmers of group III who received the message through lecture alone gained the least increase in knowledge (18.63%). Many farmers gave the feedback that they started getting bored after 30-40 minutes of attending the lecture. Though the farmers were interested in knowing the practicalities of ratoon management, they felt that it was monotonous and boring; lack of appropriate audiovisual aids hindered them from comprehending the modalities of the new management technologies. *Gale (1990)* reported that audiovisual communication was socially appreciated as positive, personal and informal.

Perception of farmers about computer multimedia : As most of the respondents in this study were exposed to computer based instruction for the first time, the responses were quite interesting. The multiple responses obtained from the respondents are given in Table 2.

On the whole, the farmers were highly impressed about the computer multimedia as an educational tool. The incorporation of still pictures and short video clippings made the multimedia interesting. Videos are rich in images and are able to reach many more people compared to conventional training workshops (*Zossou et al 2009*). With regard to user satisfaction, ease versus strain, and enjoyability versus boredom, *Faber et al. (1991*) found that learning by motion pictures is significantly easier and more enjoyable than learning without motion pictures. *Nicolson et al. (1991)* also found that their participants enjoyed multimedia courseware. These findings support the idea that multimedia leads to positive arousal, which contributes positively to learning attitude and motivation.

Table 2. Perception of farmers about computer multimedia (N=79)

S. No.	Perception item	No.	%	Rank
1.	Can learn at my own pace of learning	61	77.22	VI
2.	Use of different multimedia building blocks helps in better comprehension	72	91.14	II
3.	Multimedia is fun and enjoyable	71	89.87	III
4.	Availability of message in the computer for future reference	58	73.42	VII
5	The learning experience was a memorable one	47	59.49	IX
6.	Was thrilled to learn through computers	70	88.61	IV
7.	Multimedia is an interesting and educative tool	73	92.41	I
8.	Learning by ourselves was a new experience	68	86.08	V
9.	Simultaneous narration for the visuals made us more attentive	57	72.15	VIII
10.	Learning through computer lack a human touch	41	51.90	X

For majority of them multimedia is an interesting and educating tool (92.41%) and comprehension of the message is high due to the use of varied multimedia building blocks (91.14%). For almost 90 per cent of them, learning through multimedia is fun and enjoyable due to the animation feature added in the modules. In a developing country like India, only during the last decade, usage of computers is in the incline in the urban areas. Computers are yet to penetrate into the rural settings. Coimbatore district has almost cent percent literacy rate and computer literacy is also high and is considered to be a forerunner both in agriculture and industrial front. Even in such a back drop, computers are not put to use in the rural villages. The introduction of computers for training farmers is a milestone in this regard. ICT initiatives of this sort are very well received by the farmers and they really felt thrilled to learn through

computers (88.61%). Though a couple of years have passed, farmers still have a vivid picture of the multimedia. This was also reflected during the survey for adoption studies.

Perception of farmers about lecture method: Lecture method is a traditional way of teaching in the rural areas. In a normal setting, lecture is always supplemented by other audio-visual aids. But in this case, the message was given only through lecture and this made them feel that lecture is boring and monotonous (96.39%) (Table 3). Though the participants varied widely in their profile, 93.98% of them reported that they could concentrate barely for half an hour.

Table 3. Perception of farmers about lecture method (N=83)

S. No.	Perception item	No.	%	Rank
1.	Span of attention is hardly up to 40 minutes	78	93.98	II
2.	Continuous lecture is boring and monotonous	80	96.39	I
3.	Had to imagine most of the things taught	64	77.11	VI
4.	Lecture would have been better with at least method demonstration	72	86.75	IV
5	A break in between would have been better	51	61.45	IX
6.	The delivery of the message was not very clear	48	57.83	X
7.	There was no linear flow of the contents, rather it was jumbled	52	62.65	VIII
8.	Usage of technical jargons hindered quick understanding of the message	60	72.29	VII
9.	The matter was given in a condensed manner within a short span of time	68	81.93	V
10	It would have been better if we were provided with hand outs	77	92.77	III

It had been noted in earlier training sessions on different topic in the same locale that farmers had remained attentive continuously for up to three hours. This is an indication that any new message to be effective should target the different senses like hearing, seeing, sensing etc. Feedback given by 81.93 per cent of them is that too much messages were thrust within a short time. The respondents were of the opinion that, had the same message be given in split modules it would have been more effective and useful. In general, the farmers were not satisfied with lecture method alone.

Suggested changes: Computer multimedia is a new introduction as a training tool. Hence, along with the perception schedule, the farmers were also asked to express their suggestions for the improvement of the module i.e. 1. More multimedia module on specific topics *viz.*, planting systems, new sugarcane varieties, trash composting, vermicomposting, enrichment of pressmud, drip fertigation, tractor drawn implements etc. are needed. 2. Such modules should be made available in the local television clubs and computer clubs enabling us to learn at leisure.3. Incorporation of case studies of successful farmers in the locality will be a motivation for other farmers. 4. Add more video clippings so as to have a feel of the technology and increase the attention span and 5. Immediate online tests for evaluating our comprehension can form a part of the computer multimedia.

CONCLUSION

The findings of this study revealed the comparative effectiveness of computer multimedia to traditional lecture method. No doubt, the farmers were positive with respect to multimedia and its value as a media of study. They felt that when lecture was supplemented with multimedia, the retention of message was increased due to reinforcement. The findings also stressed that computer multimedia would serve as a valuable supplemental tool to lecture.

Farmers' perception on multimedia indicated that it has a distinct educative value and seems to contribute to more effective information and technology transfer. Multimedia also makes it more exciting to learn. The knowledge so acquired was also translated into action as revealed by the rate of adoption of the technologies. Currently, the ratoon management practices advocated through the training are being adopted by other cane growers in the vicinity of the fields of the trained farmers also. The message transfer here was mainly through word of mouth. Studies on the impact of multimedia suggest that the optimal teaching strategy depends on the type of target audience taught. Some degree of flexibility would be required of the instructor who wished

to implement the optimal strategy because the mental makeup of the target group and the topic under consideration may require different treatment (*Childers et al 1985, Frey 1994, Smith and Woody 2009*).

On the basis of the findings of this study, it can be concluded that multimedia, though a rich communication tool on its own, when combined with other media, it can create a new training paradigm.

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