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Self-Directed Learners or Not? Delivering Agroforestry Technology to Farmers in the Philippines

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This paper presents an evaluation of the usefulness of a participatory approach and adult learning principles for agroforestry extension in the Philippines. Visual observations and analysis of interviews with farmers during an extension program found that their ability to act as self-directed adult learners changed according to the situations with which they were faced. Farmers used a self-directed approach to their selection of inputs for the establishment of woodlots. However, when propagating seedlings, lack of technical knowledge caused them to shift to a state of dependency on 'top-down' didactic instruction. Farmers' familiarity with agricultural crops, e.g. rice and coconuts, did not provide them with the skills to raise tree seedlings. A consequence of farmers applying their own interpretation of woodlot establishment procedures was that some sites were destroyed and seedling growth on other sites was poor. These failed woodlots are likely to present a negative image of the program in the future. Contributing influences to farmers' limited uptake of technology may have been a lack of other sources of support and information and the difficulty of interacting and sharing ideas with their peers. The practical implications of this research are that farmers in developing countries may lack the education, support services and peer-to-peer interaction to behave similarly to self-directed learners in developed countries. A totally participatory approach to program delivery may maintain participants' enthusiasm and commitment but may result in unforseen outcomes. Hence, a flexible approach to the use of adult learning principles may be necessary.

Keywords: Participatory, Adult Learning, Constructivist

Introduction

Despite technological advances, agroforestry extension has experienced uneven success in many parts of the world due to inadequate adoption rates or abandonment (Subhrendu *et al.* 2003). A contributing reason may be the manner in which farmers apply silvicultural[1] technology. For example, (Harrison *et al.* 2008) found that low seedling quality is generic to small nurseries in south-east Asia. Poor tree growth resulting from farmers' reluctance to thin weaker and deformed trees is a major constraint to profitable tree farming in the Philippines (Bertomeu *et al.* 2006). However, until recently, agroforestry adoption studies have been concerned with biophysical rather than socio-economic variables (Mercer 2004) and there have been few studies in developing countries which investigated how farmers learn. Hence, the purpose of this paper is to report aspects of farmers' learning behaviour which affected the outcomes of an agroforestry extension program in the Philippines.

In the current ethos of rural extension a participatory approach is almost mandatory, participants' commitment being boosted by an extension process which encourages people to take responsibility for their learning (Franzel & Scherr 2002, Ganpat *et al.* 2009). This approach is in accord with Knowles' (1984) principles of adult or 'self-directed' learning that adults' past experience is the basis of their learning, they are most interested in learning which is applicable to their lives and learning is problem centred rather than content centred. Farmers' self-direction was metaphorically noted by Cramb (2000) that technological assistance may be described a 'cake' in which farmers shop around for technological 'ingredients' which they incorporate into their own 'recipes'. Providers act as facilitators rather than teachers and the process is participant-centred rather than technology-centred.

Although Knowles' principles are consistent with Cramb's metaphor, adult learning techniques have been criticised for representing an 'American' concept of independent, self-directed adult learners (Reischmann 2004). However, a participatory approach to extension and adult learning principles are both underpinned by a constructivist[2] view of learning which is independent of race, culture and socio-economic status. Hence, if an extension process is considered as a system of inter-related variables, participants' ability to behave as self-directed learners is important. Recent research into participatory extension (e.g. Anderson *et al.* 2006, Magcale *et al.* 2006, Minh *et al.* 2010) suggested that where participatory principles are not followed, (e.g. inflexible or top-down didactic delivery methods and failure to match participants' objectives), extension programs often fail. A consequence of a participatory approach is that extension program planners lose control over the extension process. For controlling of program activities is ceded to participants, the likeli-

[1] In this paper, the term silviculture includes seedling propagation, site preparation, woodlot establishment and management.

[2] The principles of constructivism are that learners 'construct' new ideas based on their current knowledge. People come to learning situations with a mental structure of past experiences and this influences their understanding and uptake of information (Dewey 1995).

hood of unexpected outcomes increases.

One of the activities of Australian Centre for International Agricultural Research (ACIAR) project ASEM/2003/052, Improving Financial Returns to Smallholder Tree Farmers in the Philippines provided an opportunity to investigate the application of adult learning principles to agroforestry extension. A participatory approach which treated farmers as adult learners was used to deliver the program and collect qualitative and quantitative data which provided information about farmers' acceptance of agroforestry technology. During the program, changes in farmers' use of technology prompted questions as to whether a flexible rather than a totally participatory approach may be appropriate for the delivery of agroforestry extension assistance.

This paper provides an assessment of the usefulness of adult learning principles for an agroforestry extension program in the Philippines. In the next section, a précis of the methods of the extension program is presented. In the following section, farmers' attitudes and responses are analysed in relation to the situations and difficulties they encountered throughout the program. Finally, recommendations are made for the delivery of agroforestry extension in similar contexts and settings.

Research Methods: The Approach to the Delivery of the Extension Program and Data Collection

The methodology and results of the extension program is reported in Baynes *et al.* (2009) and a précis is presented below. The influence of farmers' mental models on their acceptance of technology is also reported in Baynes *et al.* 2010).

Between 2005 and early 2008, assistance was offered to farmers in four municipalities on Leyte Island to grow seedlings in home nurseries and establish woodlots. Deforestation of the countryside has been severe and there are few examples of woodlots grown by smallholders for commercial sale or domestic use.

The purpose of the program was to evaluate farmers' willingness and ability to adopt agroforestry technology. In the municipalities of Libagon and Dulag, extended assistance was offered in three stages, *i.e.* first, recruiting farmers and establishing their specific needs, second, propagating seedlings in home nurseries and finally, preparing sites and out-planting seedlings. In Libagon and Dulag 22 farmers participated in the program and 19 of them established woodlots. Farmers initially had little understanding of nursery and woodlot establishment skills. The only serious problem in the delivery of extension assistance occurred when persistent rain caused severe fungal infection of young seedlings and consequent loss of farmers' confidence until remedial assistance was made available. After one year, the survival of woodlots was 74%, remaining sites being abandoned, washed away by floods or burnt.

The Participatory Approach Used to Deliver Extension Assistance

The program was run by Filipino ACIAR staff that had extensive field experience of rural extension. It was anticipated that some farmers may wish to join the program to see what benefits it may bring. Hence, assistance was offered as a series of learning activities in which farmers were offered technical advice through group and on-farm visits. Farmers were offered assistance to collect seed, grow seedlings in home nurseries, prepare sites and establish woodlots. They were allowed to decide how many trees they wished to raise, and how and when woodlots were to be established. However, in order to propagate healthy seedlings and maximise site capture of out-planted trees, they were encouraged to maximise inputs, e.g. fungicide, fertiliser and weed control. Also, to remove as many barriers as possible to farmers' uptake of assistance, individual on-farm visits were arranged to accommodate farmers' availability. Fortunately, the traditional Filipino capacity for friendship and humour proved invaluable in breaking down social barriers between farmers and extension staff. Meetings became quasi-social and collaborative.

Data Collected through Analysis of Interviews and Observation of What Farmers Actually Did

To test whether farmers were self-directed learners or not, extension staff conducted interviews in which farmers' progress, problems, attitudes and opinions were recorded. They also observed what farmers actually did and the extent to which farmers' actions complied with recommendations and advice. Data were collected on four main occasions:

1) Recorded comments and visual observations made during an initial field day;

2) Initial interviews with prospective program participants;

3) Interviews with farmers during the seedling propagation stage;

4) Visual observations of the methods farmers used to establish woodlots.

The purpose of the data collected during the recruitment stage (*i.e.* the field days and initial interviews), was to determine the level of assistance which may be required. During the second stage, the on-site interview provided information about farmers' seedling propagation problems and their plans for site preparation and out-planting. A comparison of farmers' stated intentions and actions was provided through a final inspection of their woodlots.

Recorded interviews were transcribed and analysed for sections of text which could be grouped into generic themes. During the initial interviews, for example, comments which indicated farmers' knowledge of potential problems relating to woodlot establishment were grouped under two generic headings problems farmers can overcome and problems farmers cannot overcome. During the seedling propagation stage of the program, farmers were asked whether they needed on-site assistance to establish their woodlots. Their responses were classified as indicating either a directed or self-directed approach to woodlot establishment. Responses which indicated that they had planned the establishment of their woodlots, e.g. 'I will slash the grass, burn it and then dig planting holes' were classified as being self-directed. Responses which indicated a need for assistance, e.g. 'I'll need your help because I have no experience of planting trees' were classified as being *directed.* The frequency of themed responses in the overall set of interviews was then used as an indicator of the relevance and importance of specific issues.

It was anticipated that a critical factor in the success of the overall program would be farmers' knowledge of potential problems concerning the establishment, maintenance and marketing of woodlots. Hence, to determine the way in which information would be presented, during the field days, the com-

plexity of farmers' preliminary comments and questions was analysed using Bloom's taxonomy. This taxonomy was developed by Benjamin Bloom and a group of educational psychologists and one of its uses is to diagnose levels of understanding. Knowledge was classified by Bloom *et al.* (1956) as a 'cognitive domain' of six levels of increasing complexity and abstraction. The levels relevant to this research are level 2, an ability to comprehend knowledge and level 4, an ability to analyse knowledge. Values and opinions are also described in the taxonomy in five levels of an 'affective domain' in which level 2 is an ability to respond to information and level 3 is an ability to evaluate knowledge or provide an opinion. To ascertain how farmers reacted to information presented during the field days, their comments and responses to questions were recorded and classified into appropriate levels of the taxonomy. The results were then used by ACIAR staff to guide the delivery of subsequent stages of the program.

Results

The demographic characteristics of farmers who volunteered for the program, (particularly the size of their holdings and the proportion of their time spent farming) indicated they were a relatively wealthy group of smallholders compared to poor tenant farmers (Table 1). Most farmers had limited formal education and many of them were observed to have difficulty reading extension information which was printed in either their local dialect (mainly Cebuano), or English.

Evidence Gathered at the Field Days of Farmers' Readiness to Act as Self-Directed Learners

A classification of 50 comments into levels of Bloom's taxonomy for the cognitive domain found that 64% of farmers' responses were at level 2 (information was comprehended) and the remaining 36% of responses were at level 4 (issues were analysed) (Table 2). As expected, many of farmers' more complex responses could also be classified at level 3 of the affective domain, *i.e.* as an expression of an opinion. The classification of comments was necessarily imprecise because paralinguistics[3] were lost. Nevertheless, for the group as a whole, the classification provided an approximate test of farmers' understanding of agroforestry issues. The results indicated that they may be expected to behave as typical self-directed adult learners.

Table 1.
Demographic characteristic of volunteer farmers in the municipalities of Libagon and Dulag.

Demographic characteristic	Municipality	
	Libagon	Dulag
Number of farmers who received extension assistance	13	9
Number of barangays[4] represented	8	7
Average age of farmers	53	55
Average size of household	5	4
Average farm area (ha)	6.0	3.8
Average number of farm holdings	2.9	3.1
Percentage of working week spent working on farms	60	60
Most common farm use	Coconuts	Coconuts
2nd most common farm use	Bananas	Bananas

Table 2.
Examples of farmers' comments classified as level 2 *and* 4 *of Bloom's taxonomy for the cognitive domain.*

Comments classified as level 2 (*comprehension*)
This tree is crooked so we need to cut it out.
How about growing seedlings in sawdust?
Comments classified as level 4 (*analysis*)
Based on our understanding, mahogany always has that kind of roots, how can we overcome that?
It's easy to kill the grass. I give it to our neighbours. They'll cut it for free.

The initial interviews with farmers who indicated that they wished to join the program were purposely conducted in a loosely structured inductive manner in which farmers were given as few verbal prompts as possible. This encouraged farmers to speak their thoughts openly. Hence, farmers were asked about positive and negative aspects of growing trees and the problems which they either could or couldn't overcome. Themed responses showed that, not surprisingly, 70% of farmers wished to grow trees for housing materials and 43% of them wished to leave woodlots as a legacy for their children. Many of their answers indicated that they had considered their response before speaking. For example, at the start of the field day, 75% of farmers had indicated that they had little understanding of tree registration[5] procedures. Extension staff had anticipated that their knowledge of this topic would be poor and had arranged for a lecture on tree registration procedures by the Department of Environment and Natural Resources (DENR). Several weeks later, during the initial interview only 17% of farmers considered it as an issue with which they may have difficulty with in the future. Similarly, the 48% of farmers who held title to their land with other family members or subleased it to tenants indicated that it was a problem that could be successfully negotiated. In addition 52% of farmers discussed how they would market lumber from their woodlots. Overall, the farmers presented an image of independent and self-directed learners (Table 3).

Farmers' Reaction to Technical Difficulties

The possibility of farmers quickly becoming independent of technical assistance was lost once they encountered technical difficulties. When persistent rain caused widespread fungal infection and consequent losses of seedlings, farmers became discouraged and the program came close to collapse. Only 9% of the 22 farmers were able to grow healthy seedlings without personal assistance. During interviews, farmers' comments reflected a complete dependence on extension assistance and advice (Table 4). They had no other basis for comparing information provided by ACIAR staff. There are few municipal libraries in Leyte and the focus of the 'Techno Gabay Program', which provides extension information to farmers, is agricultural crops and production systems. Even if farmers had been able to access the internet, their reading skills (particularly in English) would probably have precluded them from finding a remedy for their problems.

Difficulties accommodating farmers' schedules necessitated individual on-farm visits and inevitably, the mode of extension assistance reverted to top-down didactic instruction. However,

[3]Paralinguistics include body language and the pitch and the volume of speech.

[4]A *barangay* is the smallest unit of local government in the Philippines and is approximately equivalent to a village.

[5]In certain circumstances, woodlot trees must be registered with DENR before they can be harvested.

Table 3.
Examples of farmers' responses which indicated an ability to behave as self-directed learners.

In regard to fire, I'll conduct brushing during rainy season and conduct only a strip brushing with a 1 m wide strip
Financial problems can be managed if you base your planting on your capability to manage and maintain the trees

Table 4.
Typical farmers' responses to interview questions concerning fungal infection of their seedlings.

I don't know what to do Ma'm, please help me?
What do you mean by hardened sir? Kindly explain.

farmers responded positively to instructions and almost all of them managed to grow sufficient healthy seedlings to warrant out-planting.

Comparison between Preliminary Evidence of Farmers' Self-Direction and What They Actually Did

The final stage of the program involved site preparation and out-planting. By this stage of the program almost all farmers had regained their confidence and had raised sufficient seedlings to warrant out-planting. In some cases it had not been possible for extension staff to visit sites before seedlings were planted. Hence, the main source of evidence of farmers' acceptance of technology was a comparison of farmers' stated intentions and a final inspection of the woodlots.

The interviews which had been undertaken in the previous stages were examined for sections of text which could be classified as indicating a directed or self-directed attitude towards further assistance. In 20 interviews, 85% of the farmers made comments which indicated that they were no longer reliant on extension assistance (Table 5). For example, several farmers had planted trees on previous occasions. Consequently, they felt confident of their ability to do so again. Other farmers made comments which could be interpreted both ways, *i.e.* they requested assistance and then made comments that indicated that they had already decided how they were going to establish their woodlots. Despite being offered individual on-farm assistance, only six farmers (*i.e.* 27% of the original cohort of 22 farmers) accepted an offer of final assistance from extension staff to set out, plant and stake trees.

Final inspections revealed that some woodlots had been planted on very steep or eroded sites, underneath a dense canopy, in flood prone locations or directly adjacent to coconuts (Table 6). One year after planting, site maintenance (*i.e.* slashing of competing vegetation) had virtually ceased even though seedlings had not achieved dominance over weeds. In each case, these decisions had long-term implications for the growth of the woodlots. Neglecting weed control before seedlings have achieved site capture is likely to result in poor seedling growth and stagnation of the stand. Planting trees underneath a dense canopy is also likely to lead to very poor growth. Trees planted on the flood prone sites were washed away soon after planting and not surprisingly, those farmers became disenchanted with the program. One year after planting, seedlings which had been planted adjacent to coconuts showed poor growth and evidence of suppression. Despite extension advice to the contrary, some farmers had applied technology in a manner inconsistent with sound principles of woodlot establishment.

Table 5.
Examples of farmers' comments which indicated that they were not reliant on extension assistance to establish woodlots.

I'll plough before planting and clean up the area. I don't need other assistance.
If I want your presence or help, I'll contact you. I have Mr Duan's number and he will call you.

Table 6.
Characteristics of sites chosen by farmers for reforestation.

Municipality and number of sites	**Percentage of sites with specific characteristics**			
	Infertile or eroded	Dense canopy	Flood prone	Integrated with other crops
Libagon (12)	42	8	0	67
Dulag (7)	0	0	43	100
Total (19)	26	5	16	79

Discussion and Conclusion

For the cohort of Filipino farmers served by this extension program, their self-directedness varied according to the challenges they faced. A participatory extension approach in which farmers were allowed to apply technical information to their own circumstances maintained their cooperation and enthusiasm but in situations in which they realised that they were knowledge-deficient, they also accepted didactic and top-down instructional methods. In a broader context, these results suggest that self-directed extension program participants may not object to inclusion of top-down instruction, provided that they see the need for it.

The results of this program suggest that although a participatory approach may be required to ensure farmers' participation, their interpretation of technology may compromise program goals. Farmers' initial ability to list, discuss and analyse issues (e.g. tree registration), suggested that they would act as self-directed adult learners. However, their lack of technical knowledge constrained their ability to evaluate the veracity of technical advice. In situations where they chose to ignore advice, their personal interpretation of the principles of tree growth resulted in the establishment of woodlots, some of which are unlikely to present a positive image of agroforestry in the future. Seedlings which are grown on infertile sites in competition with weeds are likely to become chlorotic and spindly and the entire woodlot may stagnate. In these situations, farmers' subsequent disappointment is likely to result in negative publicity. Despite the high level of one-to-one extension assistance which was provided in this program, farmers' lack of experience and the scarcity of examples of well-maintained woodlots in Leyte may have induced some of them to take an inappropriate low-risk and low-input approach to agroforestry.

Farmers' low-input approach may have been modified if they had been able to access complementary sources of information. A contributing influence to farmers' lack of competency in raising seedlings may have been the dearth of other information or support services. Unfortunately, farmers were unable to transfer their knowledge of other farming practices to tree seedling propagation. Although information concerning growing and marketing of other crops (e.g. rice, copra) was available through farmer co-operatives and government sponsored information services, this information is not applicable to agroforestry. In addition, the geographically scattered occurrence of participating farmers, *i.e.* the recruitment of 13 farmers

from eight barangays in Libagon and nine farmers from seven barangays in Dulag, inhibited farmer-to-farmer interaction. Consequently, those intuitively self-directed farmers who would have welcomed other sources of information were unable to access it.

A general problem confronting rural extension planners in developing countries is to maximise recruitment and maintain participants' enthusiasm, consistent with program goals. Farmers' interest is often sparked by an inclusive extension approach which offers information and expertise in a new agricultural activity. The promise of new knowledge *per se*, also has a novelty value. In this program, the low level of farmers' acceptance of out-planting assistance indicated that the novelty had partly dissipated by the time seedlings were ready for out-planting. Farmer's need for assistance was less urgent than when they were raising seedlings. Hence, some of them opted to ignore offers of assistance and to use inadequate woodlot establishment practices which were derived from their prior knowledge and experience. These results suggest that if farmers in developing countries are not supplied with a range of experiences and background information, (e.g. demonstration farms, peer-to-peer interaction) which allow them to develop as informed self-directed learners, then they are unlikely to fully benefit from assistance. In this sense, these farmers have special needs which set them apart from 'western' self-directed adult learners. Hence, providing them with complementary learning experiences may be well rewarded.

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