

Transferring agricultural technologies – Need to supplement the formal learning with informal learning

Abstract

The crop and the animal husbandry demands knowledge and skills as any other vocational enterprises. Similar to inheritance of land and other assets by the heirs, the owned knowledge and skills are transferred through self-learning or informal learning from one generation to the other. However, due to commercialization of farm activities and their applications, the process of informal learning is now taking different dimensions. Such commercialization also necessitated farmers to aspire for formal trainings and to achieve faster transformations through agricultural technologies. These technologies are being transferred to farmers by the experts mostly by formal trainings vis-à-vis formal learning. The knowledge and skills already possessed by these farmers however need to be supplemented with newer knowledge and skills acquired. This empirical study focusses on the type of trainings undergone by farmers to acquire the technologies and also measures the nature of informal learnings that took place even after these formal trainings. The study found that some fine-tunings or tinkering of the technologies with traditional knowledge already possessed by the farmers become essential. This could also lead to specialization and improve the adaptability. The farmers with their own experience and self-learning found to improvise such skills.

1 Informal learning – The concept

Individuals acquire knowledge and skills through various means. Out of which, the formal and informal means of learning is very well catalogued. In contrast to formal learning, the informal learning however takes place outside the curricula of educational institutions and in the process; there is no institutionally authorized instructors (Radaković & Antonijević 2013; Mallett et al. 2009). The learnings could occur independently and sometimes group the intended goals of the explicit curriculum (Etling 1993). The learning is thus not intentionally accessed by the learner and hence neither structured nor institutionalized (Smith & Clayton 2009). It can be also intentional or unintentional and is encouraged by the development of techniques and technologies. The goal of learning through informal means is largely for personal development rather than economic efficiency (Mokhtar 2010; Mezirow 2008). Nevertheless, informal learning in an information society gives endless opportunities (Livingstone 1999; Schugurensky 2000; Dissanayeke et al. 2014; Dissanayeke et al. 2015). There is also no time-line to acquire such knowledge as learning occurs anytime and anywhere. Thus, informal learning is much more flexible and not time bound.

1.1 Informal learning in agriculture

Informal learning in agricultural sector plays a vital role, especially when farmers are engaged in crop and livestock production. The farmers perform various farm operations and these are operated largely by farm families (Rama Rao et al. 2017). In the recent years, these farm operations are becoming increasingly complex due to various reasons and the application of wide range of technologies and practices is one of the factors for the complexity (Oreszczyń et al. 2010). Generally, these farm operations are being performed not necessarily by fully understanding the scientific principles. In many of the situations, the farmers, as indigenous community share the agricultural knowledge that is accumulated over generations. A part of this knowledge is documented and transmitted through local languages and a major portion is still not recorded and remains confined to local communities (Lakshmi Poorna et al. 2014). In India, many of the farming communities have been traditionally organized around a social ecology that included clans or family connections and share their knowledge mostly through informal ways. The informal learning and knowledge transfer is thus an important part of agricultural enterprises in production of crops and livestock, storage after harvest, processing and marketing of products.

Shukla et al. (2017) while studying about communities from the remote rural regions of India stated that young learners' informal learning experiences often come through their interactions with local agriculture and the environment in which they and their families work and learn. Informal learning experiences are thus observed to be a part of 'indigenous knowledge systems', a concept varyingly described as traditional knowledge, local knowledge, traditional ecological knowledge, rural people's knowledge and subaltern knowledge (Strauss 2016). However, due to complexity and commercialization of farm activities and their applications, the process of informal learning is now taking different dimensions. These commercialized activities also necessitate farmers to aspire for formal trainings and achieve speedy transformations through agricultural technologies by such trainings. Hence, these agricultural technologies are being transferred to farmers by the experts mostly through formal trainings vis-à-vis formal learning.

Therefore, the knowledge and skills already gained by the farmers, however, need to be supplemented with newer knowledge and skills acquired, what we establish here as the learning-mix and the contemplation is that informal learning takes place even after the formal trainings. This is what we conceptualize in this study as tinkering of the knowledge already possessed by the farmers through informal learning and later acquired through formal trainings.

2 Objective of the study

The specific objectives of this study are three folds:

- To analyse the application of various informal learning experiences in farm operations
- To identify the nature of formal trainings acquired by the farmers and

- To map and evaluate the blending of informal learning experiences with the formal training

3 Sampling and analysis

A multi-stage random sampling technique was followed in selecting the respondents. In the first stage, Dharmapuri district of Tamil Nadu was selected based on the following criteria. As per the 2011 census, this district had the lowest literacy rate (68.5 per cent) as against the overall literacy rate of 80.1 per cent in Tamil Nadu State (Government of Tamil Nadu 2016). Moreover, as per the Human Development Index, this district has occupied the lowest position among the 31 districts in the State. Hence, many training programs and welfare measures were undertaken by various agencies in this district. In the next stage of sampling, from eight blocks in the district, one block was selected at random. From this block, three villages were selected at random and from each village, ten farmers were selected at random. Thus, 30 farmers were selected for the study. Personal interview was conducted with structured questionnaire to collect the primary data from the farmers.

Farmers were found to apply their knowledge and skills in three major decision making areas namely crop-livestock production, storage-processing and marketing vis-à-vis the market channel and price discovery. The skills acquired through formal trainings supplemented the above decision-making areas. The application of informal learning in farm operations was done in this study based on the conventional three forms of learning namely self-directed learning, incidental and socialization (Schugurensky 2000). Further, we developed a modified mapping framework to visualize the fine-tuning (tinkering) of formal trainings with the informal learnings. It is also found that while data collection, few farmers did not undergo any formal training. The application of informal learning experiences and issues related to farm decision-making areas by the farmers who had no formal trainings was also evaluated.

4 Findings and discussion

4.1 Demographic Profile of the sample respondents

The Table 1 below presents the demographic details of the sample respondents who were interviewed.

Table 1: **Profile of the respondents.**

Particulars	Number of respondents	Percentage
1. Gender		
Male	24	80.0
Female	6	20.0
2. Education		
Illiterate	7	23.3

Literate	23	76.7
Farming business	21	70.0
Farming + other business	9	30.0
4. Parent's occupation		
Farming	28	93.3
Other than farming	2	6.7
5. Other characteristics		
	Range	Mean
Age (years)	32-59	47.1
Farming experience (years)	4-50	26.5
Land holding size (hectare)	0.61-24.5	4.1

Out of the 30 respondents, who were interviewed, 24 were (80 per cent) male farmers and only six were women (20 per cent). Majority of the respondents (76.7 per cent) were literates with educational attainments ranging from primary school education to graduation. There were seven respondents who were illiterates. Though farming was the main occupation of 70 per cent of the respondents, few farmers (30 per cent) were engaged in other business activities but related to farming i.e. trading in local market, lending farm machinery etc. The parents of most of the sample farmers (93.3 per cent) had farming as the major occupation and only 6.7 per cent of the parents of the sample farmers had business other than farming. The average age of the respondent was 47 years and they had on 27 years of farming experience with an average land holding size of four hectares.

4.2 Application of informal learning experiences in crop production and marketing

The farmer-respondents while performing the various field operations applied their informal learning experiences in three forms. Certain operations are carried out intentionally and consciously without much external influences (self-directed), few operations are carried out unintentionally but consciously (incidental). Here farmers did not have any previous intentions of learning out of their experience and after practicing few operations, they felt that they had gained additional learnings. There are some practices followed by the farmers due to values, attitudes and skills, which have been followed long, time (socialization).

In this study, the crop production operations were classified under six major categories namely land preparation practices, seeds and sowing, application of fertilizer, application of manures, plant protection and other activities including inter cultivation, handling of machinery and harvesting. Each major operation has sub-components. The details of application of informal learning in different farm operations are pictorially presented in Figure 1.

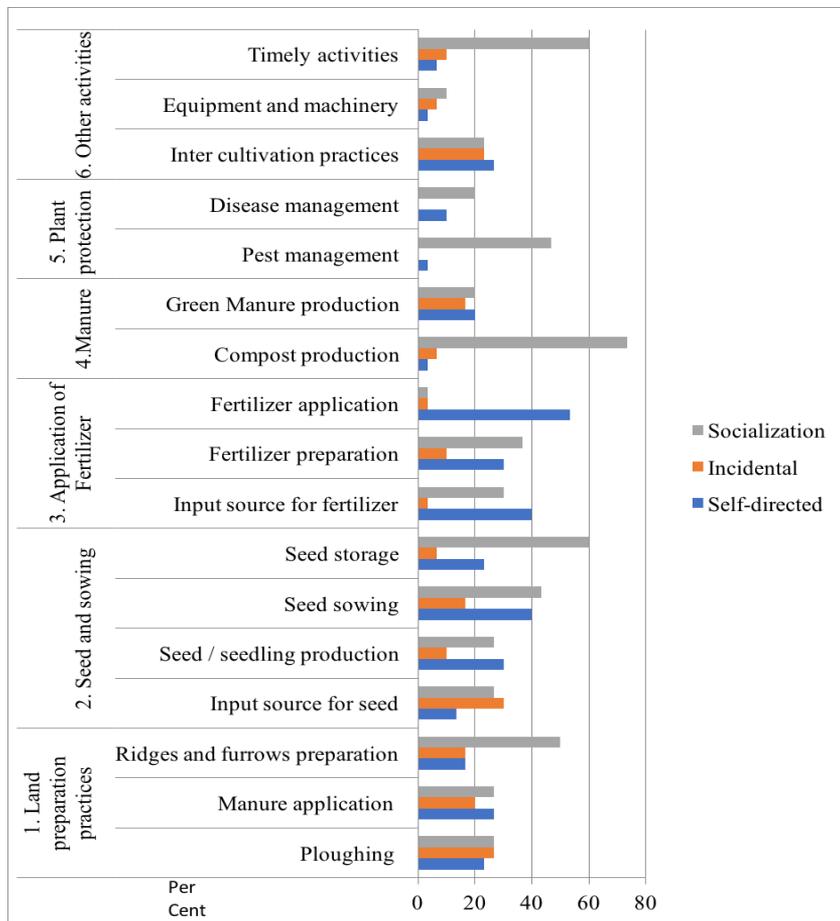


Figure 1: Application of informal learning in crop production

The Figure 1 indicates that socialization form of learning is more prominently seen while performing operations like formation of ridges and furrows, storage of seeds for further use in cultivation, production of compost and carrying certain operations in time (seasonal knowledge). The farmers had developed their own values and attitudes and internalized these while performing some of the farm operations. Such age-old values were acquired from their parents and also from fellow farmers. Further, the self-directed operations are more prominent in seed sowing, input sourcing, application of fertilizer etc. Among these operations, generally application of fertilizer is involved assistance from educator. Nevertheless, the farmers with their own learnings and experiences had fine-tuned the dosage and time of application. Interestingly, it could be seen that the operations like ploughing, inter cultivation were done unintentionally and consciously by experience. The farmers also felt that they had learnt and were aware of serious consequences like reduction in yield, weed infestation and poor quality inputs if these operations are not followed promptly.

In the case of selling of farm produce (a next major decision making area), it was found that the sample respondents used to sell their farm produce through different channels. There were four major channels through which the farmers sold their outputs (Table 2). Despite the factors influencing the choice of market channel are many, price is one of the major factors that decides the choice.

Table 2: **Selection of market channel**

Market channel	Number of respondents*	Percentage
Sale at farm gate	16	31,4
Village Market	17	33,3
Retail store	7	13,7
Through Farmer's Association	11	21,6

*Multiple responses due to selling of different crop produce

Most of the farmers disposed their farm produce either at farm gate or in nearby village markets. The decision to sell the produce through a particular channel was taken either by adopting own pricing mechanism or with the help of others (informal means). Farmers had also undergone formal training to sell the farm produce. Table 3 presents the price discovery methods adapted by the farmers.

Table 3: **Price discovery mechanism to sell farm produce**

Methods	Total	Percentage
Informal methods		
a. Own Decision	22	73.3
b. Help of others	6	20.0
Formal Training	2	6.7

Farmers who had followed price discovery mechanism were found to sell a farm produce either through own decision or with the help of others. Two farmers had undergone formal training to understand and to receive the information on market prices in different markets. It could be seen that almost 93.4 per cent of the farmers followed only informal means to discover prices and selling the farm produce either through taking own decisions based on their past experience or through the help of others.

4.3 Formal training

The major farm operations with regard to crop cultivation are land preparation, sowing, manuring and fertilizer application, plant protection and harvesting. The allied agricultural enterprises are livestock rearing, poultry, mushroom cultivation, sericulture. Depending on household goals, family-labour and other resource availabilities, these farm activities are practiced by the farmers as a potential way of raising and stabilizing productivity and profitability levels. Each activity is linked in a way that there is combination of skills acquired either through informal and formal means of learnings. The farmers had participated in various formal trainings to acquire new knowledge and skills. Such trainings were organized by Government agencies, Academic and Research institutions and Non-Governmental Agencies. The major objective of such trainings was to transfer specific technologies with skills. It was observed that the trainings were organized frequently and participation of farmers in such trainings is purely voluntary and most of the trainings were offered at free of cost.

Thus, there were farmers who volunteered themselves in participation of trainings. However, few farmers did not participate any such trainings. Hence, the sample respondents were categorized into two: those who attended formal training (attendants) and those who had no formal training (non-attendants). Out of the total 30 respondents, 22 respondents had undergone formal trainings and the remaining eight respondents did not attend any such trainings. The nature of trainings attended by the respondents was related to processing of millets, organic cultivation, compost making, mushroom production and agro-forestry. The duration of the trainings ranged from one day to a maximum of seven days.

4.4 Mapping of informal learning

4.4.1 Modifications through informal learning experience

We proposed in this study a mapping framework in order to understand the tinkering of formal trainings with informal learnings or vice-versa. All the farmers who had attended formal trainings did not attempt any modifications or improvements over the current practices at the time of interview. The level of the technology adoption and further improvements of technology practices of farmers may differ from farmer to farmer. It is also influenced by different factors like ability, skill, knowledge level, perception, resources, environment etc. Thus, only 12 farmers, out of 22 farmers who had formal training, had made such modifications either in the Same Subject Fields (SSF) where they were trained or Different Subject Fields (DSF). It was found that nine out of 12 farmers had made modifications or improvements in the SSF by putting their informal learning experiences and only three farmers used the knowledge for modifications or improvements in DSF.

Mrs. Kanaga is working as labourer in a Farmer's association producing millet based food products. She said: 'I learned processing techniques of millets from my work. Then I thought why don't I try a health drink for myself with these ingredients for my children. I succeeded.'

The above respondent has used her formal work experience with the traditional practice of preparing the health drink from millets and modified the techniques to succeed.

Mr. Malaiyappan said: 'I found coconut leaves used for shading the vermicomposting yard to minimize evaporation. I used this idea and applied in my farm with coconut leaves and coconut waste from fiber industry (coco peat) during summer to avoid evaporation in between the rows of planting area.'

Mulching is an age-old practice to minimize water lose due to evaporation in agricultural fields. The respondent was looking for right material and found suitable material. Similarly, the other respondents also made modifications and the details of nature of different formal trainings attended by the respondents and blending of the informal learning are presented in Table 4 below

Table 4: Nature of training and Modifications through Informal learning

Nature of formal training	Number of	Type of Modification/Improvements
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	respondents attended training	made
Compost Making	3	Introduction of new cage structure for bird rearing, acquiring new earth worm species from neighbouring State and use of new mulching material
Labour in Organic Farmer's Association	2	Preparation of new health drink and snacks and ready to eat foods from millets
Crop Cultivation	2	New method of feeding goats, application pruning and layering techniques of other fruit crops
Organic Agriculture	3	Use of new plant materials for pest control and green manuring in cultivation
Agro Forestry	1	Introduction of traditional trees in agro-forestry models
Mushroom Production	1	Low cost structure and use of tree shade in mushroom production

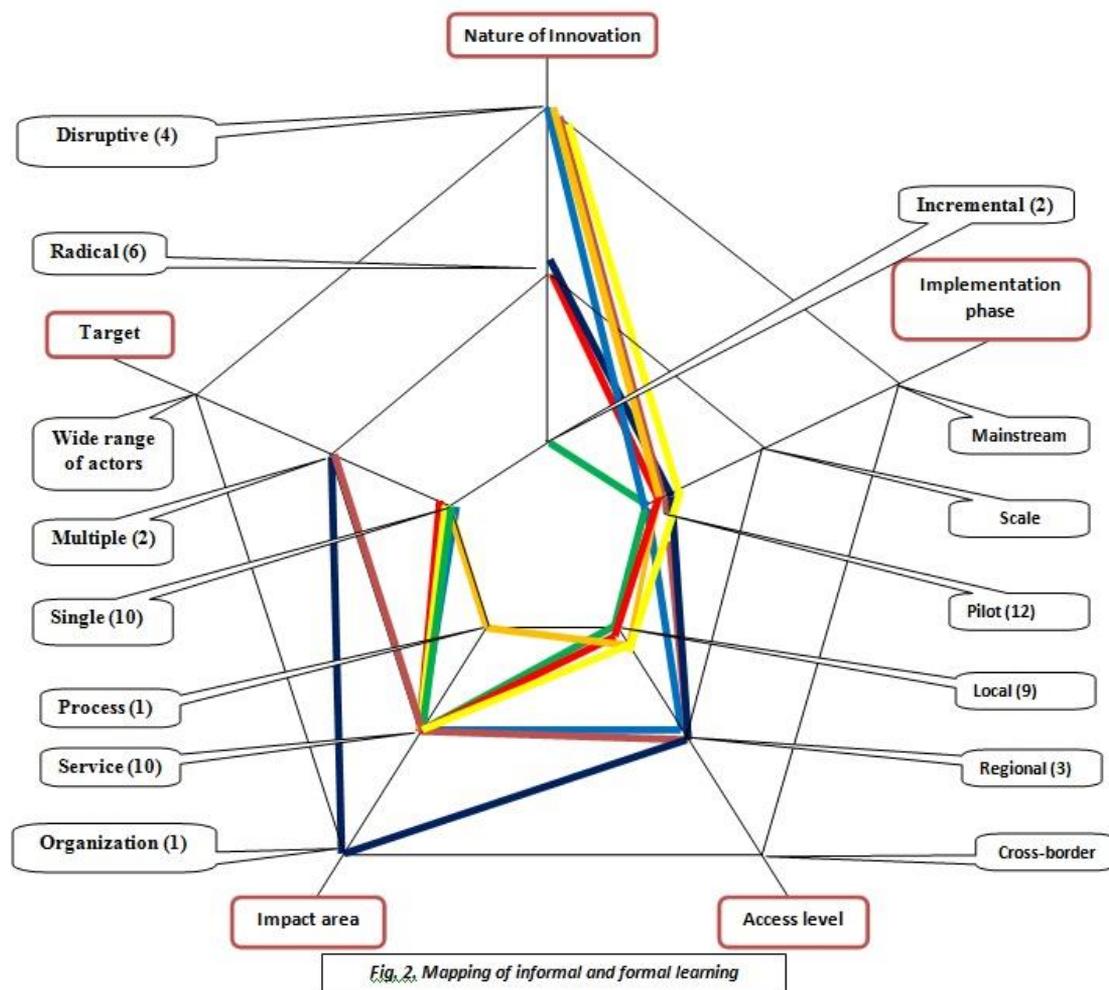
The different types of training undergone by the respondents and the nature of modification or improvements made by mixing the formal and informal learning would indicate that farmers after undergoing various trainings continue to apply the knowledge and skills related either to trainings or even in other areas.

1.1.2 Mapping framework

As we discussed earlier, informal learning could occur from any formal learning platform or through informal learning platform by own or others in the same discipline (SSF) or in another discipline (DSF).

Based on the intention of the persons, while informal learning, knowledge is made available and it is up to the individual to use it to learn or not; it is always the intention to learn that counts. The decision is up to the individual accessing the information (European Union 2016). Normally, learning process influenced by personal factors of learner, i.e. knowledge, skill, education, attitude etc. and environmental factors like resources, infrastructure etc. (Cameron & Harrison 2012). Hence, mapping of way of occurrence of informal learning through formal training platform could add value to understanding.

Elaborating the above discussion, the blending of both formal and informal learning experiences is done by designing a mapping framework of learning levels where five components are suggested namely, nature of innovation, implementation phase, access level, impact area and target. The modifications or improvements are fitted within these five components illustrating the interconnections and indicating the nature of blending among the various components and also within each component (Figure 2)



Incremental-Pilot-Local-Services-Single
Radical-Pilot-Local-services-Single
Disruptive-Pilot-Regional-Services-Single
Disruptive-Pilot-Local-Process-Single
Disruptive-Pilot-Regional-Services-Multiple
Radical-Pilot-Regional-Organization-Multiple
Disruptive-Pilot-Local-Services-Single
 Note: Figures in parentheses denoteno. of farmers

Figure 2: Mapping of informal and formal learning

In case of nature of innovation, most of the farmers (50 per cent) were able to bring innovative elements (radical) in their applications, the efforts were ‘incremental’ to two farmers and ‘disruptive’ (comprehensive change) for four farmers. The farmers implemented their innovations at ‘pilot’ level and the access level was either ‘local’ or ‘regional’ due to only limited expansion for such innovations. The impact that it could create among fellow

farmers is possible either through ‘process’ (affecting the practice of others) and through introduction new ‘services’ (new means) to expand at organization level like Farmer’s Association. Though the new learning experiences are felt by the farmers mostly as ‘single actors’ (specific group), it is likely that these new learning experiences could also influence diverse set of stakeholders (multiple actors) like agro input suppliers, raw material suppliers and so on. Thus, the overall outcome of fine-tuning of the experiences gained through both informal and formal system of learning was fruitful as it brought some progressiveness.

5 Conclusion

This study has revealed that agricultural operations are being carried out as any other vocational enterprises. Most of such operations have been carried out through informal learning experiences. However, commercialization of farm activities necessitated farmers to undergo for formal trainings. In most of such formal trainings technologies are being transferred to farmers by the experts. The knowledge and skills gained through such exposures are found to supplement the informal learning experiences. It is also found that some fine-tuning or tinkering of operations through both the means of learning has occurred. The farmers with their own experience and self-learning found to improvise such skills. The outcomes of such effort taken by the farmers were fruitful and brought many innovativeness.

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