EDIBLE LANDSCAPING TECHNOLOGY DISSEMINATION IN THE PHILIPPINES: AN EVALUATION

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ABSTRACT

The Edible Landscaping project of the University of the Philippines Los Baños (UPLB) has been contributory in the intensification of the introduction and promotion of edible landscaping in the Philippines. It serves as extension program reaching different institutions to popularize and commercialize the technology in promoting food self-sufficiency. In order to disseminate edible landscaping technology, the edible landscaping team conducts trainings to students, teachers, agriculturists, hobbyists and other organized groups in the country. This study aimed at assessing the relevance and effectiveness of the trainings conducted in 2017 as perceived by the participants. Using the Kirkpatrick's model for evaluation of training, participants' reactions, learning, possible application of the technology and the over-all effectiveness of the training were assessed. The study found that the way the edible landscaping trainings were conducted was very satisfactory and the contents were also favorable for the participants. However, many participants suggested to include more hands-on training. The knowledge they gained from the training were found to be relevant to their daily lives and there is a possibility to share and use the technology. Short courses were considered as important in imparting information, however focus on specific crops and conduct of actual planting were suggested. Other recommendations were provided to improve the conduct of the edible landscaping trainings.

Keywords: Kirkpatrick's model of training evaluation, technology dissemination

INTRODUCTION

Food security is a major issue not only in the Philippines but also in other parts of the world where cities are most exposed to new pressures on account of their ecological and political sensitivities (Morgan and Sonnino 2010). As declared by the United Nations, food security is a human right. Primarily, every human being should have an access not only to nutritious but also a suitable diet. In 2013, there is a high prevalence of undernourishment – 842 million people around the world were undernourished, of which 295 million people came from Asia (Hoevel 2013). Based on the 2013 National Nutrition Survey, there is a decrease in the vegetable and fruits consumption of the Filipinos from 249g in 1978 to 165g per capita (DOST-FNRI 2015). These figures are very far behind the recommended daily rate of 400g per capita of the World Health Organization (WHO 2003). Moreover, in the 2015 Updating Survey conducted by the Philippine Food and Nutrition Research Institute, only 33.9% of the Filipino households were food secure and 31.9% were severely food insecure. The proportion of households who experience cutting back the quantity of foods and experiences running out of food was almost equal to the proportion of households who do not experience these conditions. In terms of food consumption, out of the nine different food groups consumed by Filipinos per week, cereals and vegetables were the most commonly consumed by majority of the Filipino households. This

indicates that these foods are often found in every meal of the Filipinos. However, majority of the households obtained these food groups through purchase and only a small proportion consumed from their own produce. This phenomenon was due to lack of production area and greatly seen in an urbanized areas (DOST-FNRI 2016). This shows that there is a problem with regard to food availability, hence the need for a strategy to produce readily available and safe food.

Edible landscaping (EL) is one of the proposed technologies that can produce food under adverse conditions and can be done at the household level. This technology is similar to vegetable gardening but with an added concept of design similar to a conventional landscaping. This technology can address the inadequacy of vegetable consumption among the Filipinos because it can be done in small spaces and at the same time can be aesthetically appealing (Tayobong et al. 2013). In line with this, EL was considered as a natural extension of standard gardening because of introduction of landscape plants which have the ability to thrive in low-maintenance situations (Goodell, 2017). Edible landscape is considered as a strategic, sustainable, and urban upgrading initiative that can be designed to provide an enormous range of benefits for urban residents (Lovell 2010). Some of its benefits include providing safe and readily available crop products to the household, promoting the use of endemic plants and reducing environmental problems by greening open spaces and providing additional income (Tayobong et al. 2013). In 1999, the late Dr. Leonido R. Naranja from the University of the Philippines Los Baños (UPLB) started an EL project to promote the technology and address some of the issues related to food availability, health and nutrition, and income augmentation. EL has goals related to *aesthetics* by creating a beautiful and attractive environment that will encourage people to engage in gardening; *functionality* by establishing spaces that function depending on the needs of the end-users; *health and wellness* by providing safe, healthy, and nutritious food for the people and an environment for wellness; and *self-sufficiency* by providing the households food from "garden to table." For the Filipinos to adopt this technology, technology transfer is necessary. This can be done by conducting trainings and seminars. After a decade, the edible landscaping project continued to disseminate information regarding EL in the Philippines and assist people in starting and developing their own edible landscape garden to attain food self-sufficiency at the household level. Since then, widespread dissemination and promotion of EL was done through collaboration with different government agencies and non-government organizations. Due to the increase in demand for alternative ways of gardening or farming to combat problems of spaces and land uses, the EL team saw the need to intensify the promotion of EL technology.

There are several strategies done by the UPLB EL team to promote this technology in the Philippines to ensure adoption and help in providing every family with safe and nutritious food on their table. These include: 1.) showcasing the technology through participation in exhibits nationally and internationally to reach a wider audience, as well as the establishment of two demo-gardens to influence potential adopters; and 2.) disseminating information through the use of mass media, and conduct of trainings and seminars. Since there is a demo-garden established in UPLB, the team also conducted in-house trainings which were mostly requested. To date, the team has already conducted 69 trainings (including in-house trainings) and seminar series on edible landscaping all over the country to popularize and commercialize the technology among different institutions consisting of students and teachers, municipal and provincial agriculturists, hobbyists and other groups such as senior citizens and women's group. Seven trainings were conducted by the UPLB EL team in 2017, five of which were evaluated. The study sought to evaluate the trainings' effectiveness in terms of achieving the goals of disseminating information about EL and popularize the concept of EL through trainings.

Training evaluation is imperative to assess the effectiveness and identify the relevance of the trainings, areas for improvement and unnecessary components of the trainings that can be eliminated. Through evaluation, improvement in the overall quality of the trainings and effects on the participants can be made possible (Kirkpatrick and Kirkpatrick 2009; Farjad 2012; Raja 2014). There are many approaches to evaluate trainings, such as: 1) *triangulation,* use of multiple methods and data sources);

2) *cause-and-effect relationships,* determining the process, outcomes, and impacts of training; and 3) *training intervention effectiveness research model (TIER model)*, determining the independent, dependent, modifying, intervening, and confounding variables (NIOSH 1999). The Kirkpatrick's model, an evaluation model that includes four levels namely, *Reaction*, *Learning*, *Behavior*, and *Results*, has been widely used for more than 50 years since its development (Watkins et al. 1998; Smidt et al. 2009; Cicciò et al. 2010; Farjad 2012; Raja 2014; Ehmat et al. 2015). According to Kirkpatrick (1959), there are four levels of training evaluation: 1) *Reaction,* answering the question "How well did the participants like the training program?"; 2) *Learning,* answering the question "What principles, facts and techniques were learned?"; 3) *Behavior,* answering the question "What changes in the performance resulted from the training program?"; and 4) *Results,* answering the question "What were the tangible results of the training program?". Following the design of Kirkpatrick, the training evaluation in this study was conducted only at two levels consisting of the following: 1) the reaction of the participants and their thoughts about the training experience such as perceived relevance of the training, possibility of sharing and applying EL technology, and over-all evaluation of the training; and 2) learning from the training experience in terms of the concepts that they most remembered or had lasting impression.

MATERIALS AND METHODS

To determine the effectiveness of the trainings on EL, this study assessed the five trainings conducted from March to June 2017. A total of 119 evaluation forms were included in this assessment. The evaluation form consists of the following sections: 1) socio-demographic profile such as age, gender and organization; 2) impression about the training; 3) possibility of sharing the edible landscaping technology; 4) application of the edible landscaping technology; and 5) over-all evaluation of the training. These five trainings were directly requested from the team. Thus, this evaluation is only limited to the five trainings conducted in 2017, assessing their effectiveness and at the same time improving the design of the developed training evaluation tool.

The participants of the five trainings were varied (Table 1). Some of the trainings were requested by the participants. The trainings were facilitated by the project staff. In conducting the training, the project staff used different modules depending on the type of participants (e.g. children, senior citizen, etc.). However, facilitators varied from one training to another. It should be noted though that even if one contributory factor to the success of the trainings is their facilitation, there were no evaluations made on the facilitator/s, as well as other elements such as time allocation. Thus, using the two levels of Kirkpatrick's model of training evaluation, this study only utilized descriptive analysis of the available data from the pre-made tool.

Table 1. Trainings conducted and participants

	Training 1	**Training 2**	**Training 3**	**Training 4**	**Training 5**
Venue	Los Baños, Laguna	Quezon City	Nagcarlan, Laguna	Cebu City	Batangas City
Date	March 2, 2017	March 29, 2017	April 5, 2017	April 21, 2017	June 15, 2017
Participants	Staff from government agency; individuals from Sorsogon; church and school representatives	group of youth	Non-working mothers	Members of the adopted communities; homeowners association of a private company	Scholar students
Number of Participants	23	35	29	16	16

RESULTS AND DISCUSSION

Profile of the participants

      More participants were middle aged adults (36 to 65 years old) particularly in Trainings 1, 3 and 4 (Table 2). However, on the average, participants of the trainings were young adults (19 to 35 years old) having an average of 32 years old. The average age of the participants ranges from 19 years old to 45 years old. In all of the five trainings, the youngest participant was 9 years old while the eldest participant was 65 years old. The trainings can accommodate people of different age levels since the project already designed different modules to address this concern. In terms of gender, there were more female participants than males. This also shows that the attendance of trainings were gendered. Though the team has no particular target sectors may it be by age or by gender, data has shown that most of the participants were females. This is because most of the participants were members of women's organizations or group of women who attended the trainings as part of the initiatives of their municipalities or private companies as indicated in the request letters. This finding shows that in terms of technology transfer for EL technology, women's group can be a great target sector because of their availability. Women can engage in activities while tending to the household chores and taking good care of their children.

Table 2. Socio-demographic characteristics of the participants by training in percentage

Socio-demographic Characteristics	Trainings					Percent of Total (N=110)
	1 (N=18)	2 (N=35)	3 (N=29)	4 (N=14)	5 (N=14)	
Age group (years)						
<18	5.6	62.9	3.4	0	28.6	25.5
19-35	27.8	31.4	31.0	28.6	57.1	33.6
36-65	66.7	5.7	65.5	71.4	14.3	40.9
Average (years)	41	19	39	45	27	32
Gender						
Male	44.4	28.6	14.3	28.6	28.6	27.5
Female	55.6	71.4	85.7	71.4	71.4	72.5

Training evaluation

      Although the five trainings were conducted in different locations and have reached out to different age levels and groups, the contents of the training modules were the same. The modules included: 1) *Introduction on Edible Landscaping* (difference of EL from conventional landscaping and backyard gardening was presented); 2) *Goals of Edible Landscaping* (aesthetics, functionality, health and wellness, and self-sufficiency); 3) *Edible Landscaping components* (crops and its importance, and other materials or hardscapes that can be used); 4) *Edible Landscaping process* (how to establish and maintain the EL garden); and 5) *Artworks on Design and Implementation Phases* (how to make an artwork that can be done in the garden and how to implement it).

      EL trainings have several modules being used depending on the audience. For example, for pre-schoolers, more cartoon graphics were used in order for children to appreciate the topic. For adults, most of the trainings were facilitated through lectures of basic concepts then followed by hands-on activities and presentation of outputs to determine if the audience understood the topics discussed. Facilitators also commented on their output.

How well did the participants like the training program?

Table 3 shows the evaluation of the participants in terms of relevance of the training, possibility of sharing the edible landscaping technology, and whether they will apply the technology or not. All of the participants said that the training is relevant because it gave awareness and enhanced their knowledge. Specifically, participants from Trainings 1 and 2 mentioned that the training made them aware of the importance of vegetables in terms of improving their heath and increasing their income as they can sell some of their produce to their neighbors. They also became aware of the proper way of planting and how to value the environment. Aside from that, they also gained insight as to the importance of the protection and care for the environment. Likewise, participants also reported that their knowledge were enhanced in terms of what kind of vegetables that can be planted, why there is a need of incorporating vegetables in their garden and how to do edible landscaping. To quote some of the participants, one said "*It [pertaining to the training] is really educational*", while the other related *"...the training is meaningful."* and that *"the training is informative."*

Most of the participants indicated the possibility of them sharing the technology except for the participants in Training 4 where 75% did not respond to the question. Instead they stated suggestions. One participant wrote "*If possible, we can purchase the materials [for us] to start would be good."* This means they wanted to buy the materials used during the training. Other suggestions were directly to improve the conduct of the trainings, "*maybe this [EL] must be taught to have practical application"; "They [EL team] should provide handout."; "Allot more time";* and *"Use more example pictures on the FAQ".* When asked whether they will apply the edible landscaping technology, only 1.7% answered "maybe" they will apply the technology if there is an available space while the rest answered affirmatively. Edible landscaping is considered an urban upgrading initiative (Lovell 2010) because it can be applied even in small spaces, however, the trainings were not successful in capturing this. A recommended topic to be included in the trainings was a discussion of the mechanism of applying edible landscaping in small spaces.

Table 3. Reaction of the participants in terms of relevance, possibility to share and apply the edible landscaping technology by training in percentage.

Criteria	Trainings					Percent of Total
	1 (N=23)	2 (N=34)	3 (N=30)	4 (N=14)	5 (N=15)	
Relevance (**N=118**)						
Giving awareness	13.0	5.9	0	0	0	4.2
Enhancing knowledge	87.0	94.1	100	100	100	95.8
Possibility to share the technology (**N=110**)						
Yes	100	100	100	25.0	100	94.5
No response	0	0	0	75.0	0	5.5
Will apply the technology (**N=118**)						
Yes	95.7	100	100	100	100	98.3
Maybe	4.3	0	0	0	0	1.7

The over-all ratings given to the training were also consistent with the responses in the previous questions (Table 4). The participants were asked to rate the training from "1" being the lowest and "5" being the highest. More than 80% of the participants rated that the trainings were satisfactory or high (4) to very satisfactory or very high (5). Particularly, 59.8% of the participants gave "5" and 25.6% gave "4" which meant that the trainings were very good or were satisfactory. Nonetheless, it is also important to note that there were almost 13% who were not satisfied with the training or almost 63% of

the participants from Training 4 rated the training as "1" or very low. In terms of the weighted mean, Training 4 has the lowest mean score (1.5) and Training 2 has the highest mean score (4.91). The participants from Training 4 were members of the adopted communities and homeowners association of a private company in Cebu while participants of Training 2 were members of a youth group in Quezon City. Different modules were used in the trainings since the participants in Training 2 were youth, more pictures were included in their modules unlike in Training 4. This can be attributed to the suggestion previously mentioned by the participants in Training 4 that more example pictures in the FAQ should be included. Despite the low average rating of 1.5 in Training 4, the average overall rating of 4.24 was relatively high. This means that the training is almost very satisfactory but with improvements to be done.

As mentioned by the participants in Training 4, the training was informative. However, they were hoping for more allocation of time for the trainings, inclusion of a more practical application, and provision of handouts. This means that the EL team should have more hands-on training or actual experience of transferring the EL technology. This shows that short-courses can impart knowledge. However, it was also suggested to highlight specific crops and conduct an actual planting. This is also in consonance to the findings on the study conducted among health workers in Northern Uganda in relation to providing quality health services delivery where newly acquired knowledge provided by the trainings may increase the performance of the participants. Though the training was seen as useful, there is a need to conduct more trainings or conduct them for longer periods (Cicciò et al. 2010).

Table 4. Participants' over-all rating of the training ("1" being the lowest and "5" being the highest) in percentage

Rating	Trainings					Total (N=117)
	1 (N=22)	**2** (N=35)	**3** (N=29)	**4** (N=16)	**5** (N=15)	
5	63.6	94.3	44.8	0	66.7	59.8
4	36.4	2.9	51.7	6.3	33.3	25.6
3	0	2.9	3.4	0	0	1.7
2	0	0	0	31.3	0	4.3
1	0	0	0	62.5	0	8.5
Mean	4.6	4.9	4.4	1.5	4.7	4.2

Having 85% of the participants who gave ratings of "4" and "5" meant that the trainings were effective at the *reaction* level. However, the 14% who rated low should not be taken for granted as there is a need to improve the conduct of the training. The trainings can be improved by giving more time for demonstration as suggested by the participants. This is because EL is a technology to be applied and not just a simple concept. Past studies on learning of students have also inferred that demonstration is more effective rather than just conducting lectures (Ameh and Dahtani 2012; Muhammad et al. 2016). Furthermore, it is also important to consider incorporating more experiential learning activities in the training since it is proven effective to both traditional and non-traditional students (Davis and Summers 2015), such as in the case of participants of the EL trainings.

What principles, facts and techniques were learned?

There are different modules used in the conduct of the training designed to accommodate different age levels. Trainings 2 and 5 used the same module where there are pictures provided to the participants and more time for their creative artwork since the participants were students. Trainings 1, 3, and 4, on the other hand, used a more lecture type of module wherein more concepts were discussed during the trainings. There is an apparent difference in the mode of the delivery in both training modules to accommodate the variety of the participants. Even with the difference in the mode of delivery, the

contents of the training were consistent as previously mentioned. The contents are as follows: 1) *Introduction on Edible Landscaping*; 2) *Goals of Edible Landscaping*; 3) *Edible Landscaping components*; 4) *Edible Landscaping process*; and 5) *Artworks on Design and Implementation Phases*.

The participants were asked about what concepts they have learned from the trainings. The qualitative data were recorded and categorized in terms of the topics/contents of the module (Table 5). The table shows that almost all the contents of the trainings were mentioned by the participants as topics/contents they had remembered or had an impact to them. Almost half (50%) of the participants said that the most remarkable learning was about the *edible landscaping components*, where elements and principles of EL were discussed, followed by *edible landscaping process* (23.7%) which delved on the different procedures on how to design, establish and maintain EL gardens. This indicates that the team was able to impart knowledge to the participants which is consistent with the findings on the relevance of the trainings where 95% of the total participants reported that they have enhanced their knowledge as shown in Table 3. However, it is better if the concepts they have learned were gauged in terms of typical assessments or tests after the training so that their knowledge could be quantifiable. Given the variability of the participants, the team should design an assessment that will determine if the participants really learn the concepts by using clear scoring and measurements. Nevertheless, based on the responses of the participants, the team was able to impart knowledge.

The participants were also asked if they want other concepts to be included to improve the training. Most of the suggestions were related to: application of EL technology in small spaces or vertical spaces; crops-specific designs; benefits and opportunities of edible landscaping; nutritional facts about different vegetables; different softscapes and hardscapes; and nutrient and pest management. By reiterating the responses of the participants in the *reaction* level, 19 out of the 119 participants mentioned to allocate more time for actual planting or hands-on trainings which include: presenting the actual sample of plants that can be used for edible landscaping and the actual designing of edible landscaping. Although there is no clear cut indicator if the training was able to increase the knowledge level of the participants due to lack of quantifiable assessments such as knowledge scores, the trainings were effective based on the reported knowledge gained about EL by the respondents themselves.

Table 5. Knowledge gained by the participants from the trainings in percentage

Training Contents	Trainings					Percent of Total (N=118)
	1 (N=22)	2 (N=35)	3 (N=29)	4 (N=16)	5 (N=16)	
All	19.5	0	0	25.0	0	4.2
Introduction on EL	22.7	8.6	34.5	18.8	6.3	18.6
Components of the EL	50.0	40.0	41.4	37.5	81.3	47.5
Goals of EL	0	17.1	0	0	6.3	5.9
EL Landscaping Process	22.7	34.3	24.1	18.8	6.3	23.7

CONCLUSIONS AND IMPLICATION

The trainings were effective at two levels--by capturing the *reaction* and *learning* levels of Kirkpatrick's model. A field evaluation to specifically determine the effectiveness at the 3rd and 4th levels should be able to capture the changes in the performance of the participants as a result of the trainings and the tangible results of the training. The adopters will be the priority for the field evaluation in order to determine the extent to which the participants applied their learning and changed their behavior, and the effect on the individual or on their organizations. It is noteworthy to include other

participants who did not apply the technology to identify their reasons so that mechanisms could be developed in order to increase adoption of the technology.

At present, the study has provided reasons and guidelines for planning and conducting training and training evaluation. Other socio-economic/psychological concerns such as occupation and reasons for their attendance in the training allows the identification of potential adopters. The findings from the evaluation of four levels could serve as a benchmark that can be used for future impact assessment of the project. Since the conduct of the trainings is just one of the promotional strategies done under the edible landscaping project, it is also imperative to integrate evaluation tools for each of the promotional strategies done to measure the success of the project in achieving its goals.

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