Research article

Characteristics of Participants of Non-Formal Education Contributing to Learning Achievement: A Case Study of Snuol Commune, Kratie Province, Cambodia

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Abstract In this study, the main objective was to evaluate the number of days attended at Farmers' school and their academic ability. The research site was Snuol Commune, Kratié Province. First, the relationship between the characteristics of local farmers and the results of the achievement test was clarified. In addition, the educational effect of the Farmers' school was evaluated by multiple regression analysis. The results of the analysis are summarized as follows. 1) According to the results of the Multiple Correspondence Analysis, it was clear that the result of the achievement test was connected with characteristics of local farmers by educational background, gender, and whether or they attended Farmers' school. 2) According to the results from the Multiple Regression Analysis, after being confirmed statistically, Farmers' school attendance and educational background gave positive effects as a result of the achievement test. In addition, the results of the categorical regression analysis suggested the characteristic of the participant of the Farmers' school statistically. The participants of the Farmers' school already have the ability for reading and understanding basic Khmer. As for the educational content that the participant of the Farmers' school expected at the same time, it was suggested that it was knowledge, except the Khmers word acquisition, such as arithmetic or the environmental problem. In conclusion, creating an opportunity for the non-formal education is a necessary condition for knowledge acquisition concerning the appropriate usage and environmental problem of chemical fertilizers and pesticides in the local Cambodia area.

Keywords non-formal education, Farmers' school, Cambodia

INTRODUCTION

In Cambodia, a large amount of pesticides and chemical fertilizers have been used in order to increase the agricultural productivity. This situation has caused the destruction of the environment, such as a long-term deterioration of soil and water quality, and a decline of land productivity. The main cause of the excessive use of pesticides and chemical fertilizers this is because local farmers cannot understand appropriate use (Kazama and Honma, 2015). For this reason, learning their own language, Khmer, is necessary and important. Based on the above-mentioned backgrounds, the main objective of this study was to evaluate the number of days attended at Farmers' school and their academic ability. First, the relationship between the characteristics of local farmers and the results of the achievement test was clarified. In addition, the educational effect of the Farmers' school was evaluated by multiple regression analysis.

The research site was at the Snuol Commune in the Kratié Province. The Kratié Province is located in the northeastern part of Cambodia, where development is the slowest, and the comparable difference with other areas is large. In the Snuol Commune, the applications of agricultural chemicals, such as chemical fertilizers and pesticides, have rapidly been increasing in recent years. Although it contributed to increasing agricultural productivity, the amounts of applying agricultural chemicals caused environmental disruptions, such as soil and water quality degradation, and decreased land productivity in the long term. Until now, a local NGO distributed a document that disseminated correct information regarding chemical fertilizers and pesticides. However, one in about three people of the inhabitants of the Snuol Commune aged 25 to 60 cannot read and write, so the correct information has not been delivered. In addition, at this site, the Institute of Environmental Rehabilitation and Conservation (ERECON) carried out the project "study on sustained utilization of the natural resource" (3/2015-4/2016). In this project, the Khmer language, arithmetic, and an environmental class were conducted with support of ERECON once a week in each village for two hours.

The Kratié Province is located in the northeastern part of Cambodia, where development is the slowest and the comparable difference with other areas is large. In Snuol village, Snuol district, Kratié Province, 170,000 ha, equal to 65%, is used in the total area, 260,000 ha is forest, and 14,000 ha, equal to 5%, is used as agricultural land.

OBJECTIVES

In this study, the main objective was to evaluate the number of days attended at Farmers' school and their academic ability. First, the relationship between the characteristics of local farmers and the results of the achievement test was clarified. In addition, the educational effect of the Farmers' school was evaluated by multiple regression analysis.

METHODOLOGY

The index of a questionnaire carried out included gender and age of the respondent, educational background, and having participated in Farmers' school or not. In addition, for respondents who participated in Farmers school, attendance level, comprehension of the Khmer reading comprehension and writing ability was investigated.

The target area of the questionnaire survey consisted of the following seven villages: Kathdai, Krang, Kbal Snuol, Snuol Kert, Snuol Lech, Prek Kdey and Thpong. The survey period lasted from July to August 2015. The number of useful responses we received per area are as follows: Kathdai: 32 respondents (20.5% of the total respondents); Krang: 4 respondents (2.6%); Kbal Snuol: 18 respondents (11.5%); Snuol Kert: 41 respondents (26.3%); Snuol Lech: 20 respondents (12.8%); Prek Kdey: 26 respondents (16.7%); and Thpong: 15 respondents (9.6%). There were 156 respondents in total.

Based on survey data, Multiple Regression Analysis is applied, and the results of achievement test and the characteristics of the respondent are elucidated. Furthermore, Categorical Regression Analysis is referenced, and the attendance level in Farmers' school, and the characteristics of the respondent are clarified.

RESULTS AND DISCUSSION

Table 1 shows the differences in the means of achievement test scores for respondents. The contents of the achievement test are on a scale of one to fifteen by the Khmer language. The attributes of the respondents and the relations of the achievement test are as follows. Concerning the "Gender" of the respondents, 50% were "male" and 50% were "female." The average score of the actual test by the difference of "Gender" is as follows, "male": 11.86 (maximum of 15) and "female.": 10.41. Concerning the "Age" of the respondents, the majority of respondents were between the ages of "50-

59” years (25.0%), followed by “40-49” years (19.23%) and “More than 70” years (17.95%). The lowest percentage was aged “Less than 20 years” old. The average score of the actual test by the difference of “Age” is as follows: the ages of “50-59” years: 11.28; “40-49” years: 11.48; “More than 70” years: 10.55; and “Less than 20 years” old: 11.0. Concerning the “Educational background”, the majority of respondents had “Primary” (60.26%), followed by “Secondary” (18.59%) and “Never had been to school” (16.03%). The average score of the actual test by the difference of “Educational background” is as follows: “Primary”: 11.13; “Secondary”: 12.90; and “Never had been to school”: 8.52. The respondents of "Never had been to school" obviously had a low average on the achievement test.

Table 1 Demographic information of respondents

Index		Number of response (n)	(%)	Achievement test scoring average
Gender	1. Male	78	50.0	11.86
	2. Female	78	50.0	10.41
Age	1.Less than 20 years old	19	12.18	11.00
	2.20-29years	20	12.82	11.40
	3.30-39years	0	0.00	0.00
	4.40-49years	30	19.23	11.40
	5.50-59years	39	25.00	11.28
	6.60-69years	20	12.82	10.96
	7.More than 70 years old	28	17.95	10.55
Educational background	1. Never had been to school	25	16.03	8.52
	2. Primary	94	60.26	11.13
	3. Secondary	29	18.59	12.90
	4. High school	5	3.21	13.00
	5.College/University	2	1.28	15.00
	Total	156		
	Total average mark			11.13

source : Survey Date
Fs : Farmers School

Table 2 A question index and achievement test scoring average

Index		Number of response (n)	(%)	Achievement test scoring average
The presence or absence of attend in Fs	1. Yes	93	59.62	11.95
	2. No	63	40.38	9.94
Number of times of attend in Fs	1. 1-3 times	17	10.90	12.29
	2. 4-6 times	12	7.69	11.92
	3. 7-10 times	17	10.90	10.29
	4. Over 14 times	50	32.05	11.98
Reading comprehension	1. No	28	17.95	8.11
	2. Yes, little	82	52.56	11.32
	3. Yes, well	45	28.85	11.33
	non-response	1	0.64	13.00
Writing ability	1. No	30	19.23	8.10
	2. Yes, little	78	50.00	11.13
	3. Yes, well	48	30.77	13.00
	Total	156	100.00	
	Total average mark			11.13

source : Survey Date
Fs : Farmers School

Table 2 shows differences in the achievement test scores concerning the attendance of Farmers' school. Concerning attendance in Farmers' school, almost 60% were "Yes" and about 40% were "No". The average score of the achievement test by the difference of "attendance in Farmers' school" is as follows, "Yes": 11.95 and "No": 9.94.Concerning the number of times of attendance in the Farmers' school, "1-3 times" (10.90%),"4-6 times" (7.69%), "7-10 times" (10.90%) and "Over 14 times" (32.05%). The average score of the achievement test by the difference of the "Number of times of attendance in Farmers' school" is as follows: "1-3 times": 10.90; "4-6 times":7.69; "7-10 times": 10.29; and "Over 14 times": 11.98. Concerning "Reading comprehension", almost 20% were "No" , about 53% were "Somewhat" and about 40% were "Yes, well". The average score of the achievement test by the difference of "Reading comprehension" is as follows, "No": 8.11, "Yes, a little": 11.32 and "Yes, well": 11.33. Concerning "Writing ability", almost 20% were "No", about 50% were "Yes, a little" and about 30% were "Yes, well". The average score of the achievement test by the difference of "Writing ability" is as follows, "No": 8.10, "Yes, a little": 11.13 and "Yes, well": 13.00.

Characteristic of Respondents and the Results of the Achievement Test by Multiple Correspondence Analysis

Using attributes from Tables 1 and 2, this part clarifies the characteristics of respondents and the results of achievement test. In this analysis, Multiple Correspondence Analysis was employed.

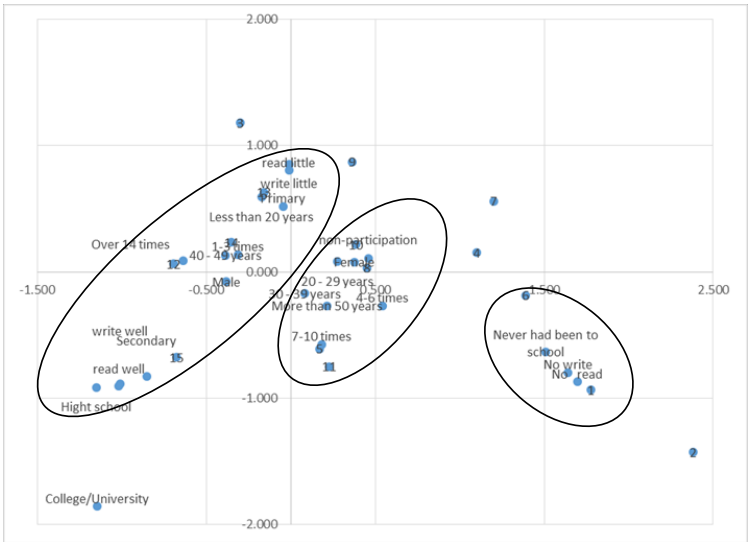

Fig.1 The result of Answer Pattern for using of the characteristics on participants and the achievement test score －Correspondence Analysis －

Figure 1 shows the results of the answer pattern for "participants of non-formal education", "non-participants of non-formal education" and "Never had been to school". In this analysis, Multiple Correspondence Analysis was employed. According to the results of the Multiple Correspondence Analysis, it was clear that the results of the achievement test were connected with characteristics of local farmers by "educational background", "gender", and "whether or not to attend Farmers' school".

Characteristic of Respondents and the Result of Achievement Test by Multiple Regression Analysis

The Multiple Regression Model is shown by Eq. (1), where Y is the achievement test score, X2 is the attendance in Farmers' school (dummy), X3 is the number of times of attendance in the Farmers'

school (1-3 times: 1; 4-6 times: 2; 7-10 times: 3; Over 14 times: 4), X4 is the educational background (Never had been to school: 1, primary: 2, secondary: 3, high school: 4, college/university: 5), X5 is the reading comprehension in Khmer (dummy), and X6 is the writing ability in Khmer (dummy). At the same time, β is the estimation parameter. The ordinary least squares (OLS) method was employed in the estimation of the regression model.

$$Y=\alpha+\beta x2+\beta x3+\cdots\cdots+\beta x6 \quad (1)$$

The estimation results of the multiple regression analysis are shown in Table 3. The statistically meaningful independent variables are as follows: X2 is the attendance in Farmers' school: 2.763 (3.083); X3 is the number of times of attendance in Farmers' school: -0.469 (-1.833); X4 is the highest achieved educational background: 1.211 (3.113); X5 is the reading comprehension in Khmer: 1.042 (0.745); X6 is the writing ability in Khmer: 1.773 (1.315), which shows a t value. From an estimated result, it was confirmed statistically that attendance of the Farmers' and the last educational background gave a positive effect to (Y) as a result of the achievement test.

Table 3 Estimation results of Multiple Regression Analysis

Dependent variable: Achievement test score	Y :				
			Estimated parameter B		
				t-value	p-value
Independent variable					
Constant			5.705	6.909	0.000 ***
The presence or absence of attend in Fs	x2	: Dummy	2.763	3.083	0.002 ***
Number of times of attend in Fs	x3	: 4	−0.469	−1.8336	0.069
Educational background	x4	: 5	1.121	3.113	0.002 ***
Reading comprehension	x5	: Dummy	1.042	0.745	0.458
Writing ability	x6	: Dummy	1.773	1.315	0.191
R Square				0.269	
Adjusted R Square				0.245	

*Note:***1% level of significance,**5% level of significance,*10% level of significance*
Source:Survey Data
Fs : Farmers' school

Characteristic of Respondents and the Number of Times of Attend in Farmers' School by Categorical Regression Analysis

The Categorical Regression Model is shown by Eq. (2), Where Y is the number of times of attendance in Farmers' school; X2 is the achievement test score (1-3 points: 1; 4-6 points: 2; 7-9 points: 3; 10-12 points: 4; 13-15 points: 5); X3 is the educational background (Never had been to school: 1; primary: 2; secondary: 3; high school: 4; college/university: 5); X4 is the reading comprehension in Khmer (dummy); and X5 is the writing ability in Khmer (dummy). At the same time, β is the estimation parameter.

$$Y=\beta x2+\beta x3+\cdots\cdots+\beta x5 \quad (2)$$

In Table 4, the estimation results of the Categorical regression analysis are shown. The statistically meaningful independent variables are as follows: X2 is the achievement test score: -0.070 (-0.707); X3 is the highest achieved educational background: 0.203 (1.829); X4 is the reading comprehension in Khmer: 0.692 (3.888); and X5 is the writing ability in Khmer: -0.518 (-2.960), which shows a t value. From estimated results, it was confirmed statistically after the reading comprehension in Khmer and the educational background gave a positive effect to (Y) as did the number of times of attendance in Farmers' school.

Table 4 Estimation results of Categorical Regression Analysis

Dependent variable: Number of times of attend in Farmers'school	Y :		Estimated parameter B	t-value	p-value
Independent variable					
Achievement test score	x2 :	5	-0.070	-0.707	0.481
Educational background	x3 :	4	0.203	1.829	0.040
Reading comprehension	x4 :	Dummy	0.692	3.888	0.000 ***
Writing ability	x5 :	Dummy	-0.518	-2.960	0.000 *
R Square				0.232	
Adjusted R Square				0.151	

*Note:***1% level of significance,**5% level of significance,*10% level of significance*
Source:Survey Data

According to the results of the Multiple Correspondence Analysis, it was clear that the result of the achievement test was connected with characteristics of local farmers by educational background, gender, and whether or they attended Farmers' school.

According to the results from the Multiple Regression Analysis, after being confirmed statistically, Farmers' school attendance and educational background gave positive effects as a result of the achievement test.

In addition, from the results of the categorical regression analysis, the characteristics of the participants in the Farmers' school were confirmed statistically, as follows. The participants of the Farmers' school already have the ability for reading and understanding basic Khmer. As for the educational content that the participant of the Farmers' school expected at the same time, it was suggested that it was knowledge, except the Khmers word acquisition, such as arithmetic or the environmental problem.

CONCLUSION

In this study, the main objective was to evaluate the number of days attended at Farmers' school and their academic ability. The research site was Snuol Commune, Kratié Province. First, the relationship between the characteristics of local farmers and the results of the achievement test was clarified. In addition, the educational effect of the Farmers' school was evaluated by multiple regression analysis. In conclusion, creating an opportunity for the non-formal education is a necessary condition for knowledge acquisition concerning the appropriate usage and environmental problem of chemical fertilizers and pesticides in the local Cambodia areas.

REFERENCES

Fujimoto, A. and Miyaura, R. 1996. An ecological and economic assessment of vegetable, Cultivation in highland areas in Southeast Asia. Journal of Agricultural Science, 40 (4), 248-263.

Fujimoto, A. 1998. The problem and possibility of food production in Southeast Asia. Agriculture and Horticulture, 73 (6), Japan.

Kazama, M. and Honma, K. 2015. The use of agricultural chemicals in Cambodia, From the interview research with rce farmers and consumers. Hokusei Review, Junior College, 13, 47-59.