Use the General Log-linear Analysis Procedure to Study Taiwanese Aboriginal Teachers in Junior High School

Lung-Hsing Kuo, Huei-Mei Wei, & Hung-Jen Yang

Abstract: - Aboriginal people have special culture and historical background so we need aboriginal teachers to give aboriginal students a better quality of education and improving their learning. This study aims to find aboriginal teacher education gaps and the relationship between age group and gender of Taiwanese aboriginal teacher in junior high school. In this study, the SPSS statistical software is used in this study, Chi-square test to test for the significance of relationships between variables cross-classified in a bivariate table. The research data would base on project report of teacher education statistics supported by Ministry of Education, Taiwan. The research population is nationwide in-service aboriginal teachers in junior high schools to obtain 378 subjects. We found there is a real relationship between age group and sex. The result shows we have strong evidence that the female Taiwanese aboriginal teachers are more than male Taiwanese aboriginal teachers in junior high school with age group of 22-29 to 35-39. We suggest there is a need to make a long term planning on junior high school aboriginal teacher education sufficient to support junior high school aboriginal education.

Key-Words: General Log-linear Analysis, teacher education, Taiwanese aboriginal teacher, junior high school education

I. INTRODUCTION

Since moving to Taiwan, the central government's educational policy for Aboriginals has gone through four stages, “the equal treatment stage”, “the fusion stage”, “the open development stage”, and “identity development stage”. The last stage is from 2001 to present day. In 2000, the Taiwan Provincial Government was trimmed and downgraded. The affairs handled by its education department were placed under MOE jurisdiction. The program to reinforce aboriginal student education of the educational reform movement project continued to be promoted. In 2003, the National Education Development Conference was announced with "respecting aboriginal identity, developing aboriginal tribal education" as the objective. In September 2004, the Aboriginal Education Act was revised and announced, mandating the development of aboriginal education [1].

In Taiwan, "Aborigines" includes mountains tribes, namely the Atayal, Bunun, Tsou, Rukai, Paiwan, Yami, Saisiyat, Amis, Puyuma, and Thao, and plains tribes including the Kavalan , Sakizaya, Ketagalan, Taokas, Siraya, Pazeh etc. The first thirteen tribes in the list are recognized by the present-day Taiwanese authorities.

According to Council of Indigenous Peoples, Executive Yuan, in 2009, the Taiwanese aboriginal education statistics shows 85.88% of Taiwanese aboriginal their highest educational recodes are high school and vocational school or below, which means there are only 14.12% Taiwanese aboriginal their highest educational records are above high school and vocational school. It is 21.28% less than non-aboriginal [2].

From the development of education historical context, the recipients of the educational experience vary by different race and class. Therefore the existing race and class issues of education become the focus for educators [3]. In Western country, the major education system is increasingly being seen as important issue on the topics of education and race [2].

The education outcomes of Taiwanese aboriginal people are the most important indicator of society improvement in Taiwan because of our environments are driven by changes in society, fast growth by science, technology and knowledge development in recent years.

Teachers are professionals and should meet the needs of students and when teachers have more professional knowledge and passion, they can be able to offer more study opportunities for them [5]. Aboriginal people have special culture and historical background so we need aboriginal teachers to give aboriginal students a better quality of education and improving their learning. Therefore, to improve learning for aboriginal students need aboriginal teachers to teach them.

To comply with the developments of democratization, our nation expected through a free market mechanism to form more excellence teachers. Thus, “Teacher Education Act” and “Teacher Act” passed in 1994 and 1995. From then on, there has been a major teacher education reform in this country: teacher education institutions were expanded beyond Teacher’s Colleges/Normal Universities to incorporate Universities with Teacher Education Centers; the plan of trainee teacher’s controlled supply and demand has also shifted from a traditional, formerly government allowance with zero tuition fee and teaching job assignment, unified and planned system to an open sufficient reserve system. Teacher education has changed from the closed-door policy to a mechanism for free competition [6].

The retirement of public primary school teachers is divided into voluntary retirement and compulsory retirement. According to Article 4 to 6 under the Civil Service Retirement Act; the conditions for voluntary retirement are the teacher teaching more than 5 years and over 60 years of age, or 25 years of service. The conditions for compulsory retirement are teachers with more than 5 years of service and over 65 years old, or over 5 years of service and not competent for teaching due to mental or physical disadvantages. Therefore, the expected retirement ages are 50 to 54 [7].

Until 2009, there are 500 reserved aboriginal teachers but it only 17.47% of the total number of aboriginal teachers in that year. However, a big decreasing on the number of aboriginal teacher students who can get the government allowance with zero tuition fee in recent 5 years that can be results in aboriginal teacher education gaps [2].

This study aims to find the aboriginal teacher education gaps and relationship between age group and gender of Taiwanese aboriginal teacher in junior high school. The rest of the article is structured as follows. First, the brief research goals and definition of terms are given in this section. Second, the methods, data sources, models, and instrument are explained, followed by the results and findings. The last section concludes with a summary in this study.

A. Definition of Terms

The variable definitions as follows:

- **Sex:** "female" or "male"
- **Age group:** 22-29, 30-34, 35-39, 40-44, 45-49, 50-54, 55 above.

II. Study Design

A. Research Subjects

Nationwide In-Service Teacher Advancement Information Web (http://www.inservice.edu.tw/) is the network provides teachers with a communication platform for in-service teacher advancement education in Taiwan and provides in-service training analytic statistics for relative educational authorities' policy- making use.

In this study the subjects are the Taiwanese aboriginal teachers in junior high school in 2009. We use 2009 Nationwide Teacher in-service Advancement Education Information Web (http://inservice.edu.tw/) database to get the subjects and Yearbook of Teacher Education Statistics (supplementary report) [8] as a reference to obtain 378 subjects. The basic data analyses are shown in Table 1 and Figure 1 and 2.

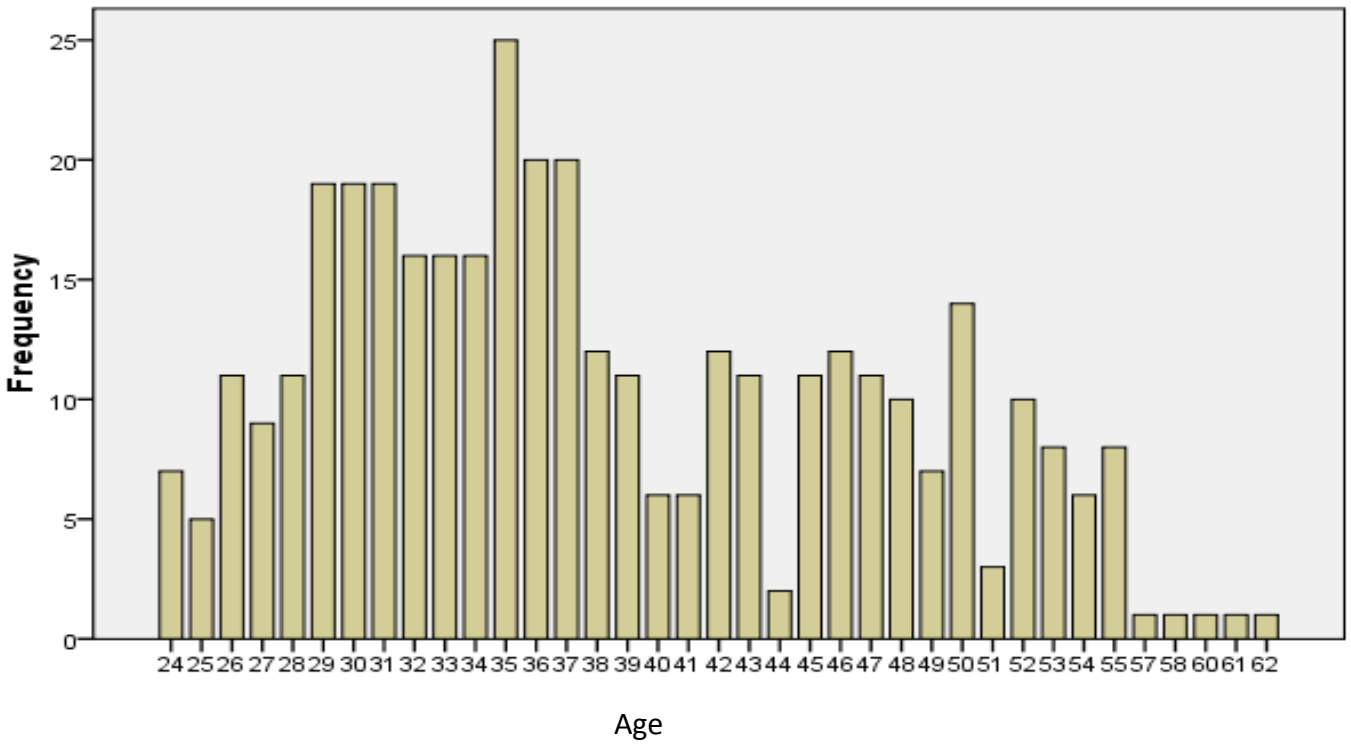

Figure 1. Age distribution

Table 1 frequency table by gender

Sex	Frequency	Percent (%)
Female	186	49.2
Male	192	50.8
Total	378	100.0

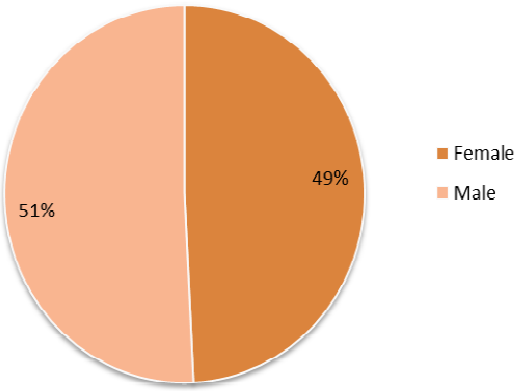

Figure 2. Pie Chart of No. of aboriginal junior high school techers by gender

B. Instrument, Data Analysis & Assumption

The SPSS statistical software is used in this study. We use Chi-square test to test for the significance of relationships between variables cross-classified in a bivariate table. In our case, the variables are the age group and sex. The null hypothesis in this study is there is no relationship between age group and sex. Then, we use Poisson regression to predict number of junior high school Taiwanese aboriginal teachers among age and sex groups.

In this study we assumes the number of Taiwanese aboriginal teachers in junior school has a Poisson distribution, and assumes the logarithm of its age group and sex can be modeled by a linear combination of unknown parameters.

III. FINDINGS

Figure 3 and Table 2 shows the number of Taiwanese aboriginal teachers in junior high school aged from 22 -29, 30 -34, 35-39, 40-44, 45-49, 50-54, and 55 above is 16.4%, 22.8%, 23.3%, 9.8%, 13.5%, 10.8%, and 3.4% of total Taiwanese aboriginal teacher in junior high school. Overall, the highest percentage of Taiwanese aboriginal teachers in junior high school falls in the age group of 35 to 39 and teachers of 55 years old or above represent only 3.4% which is the lowest.

Table 3 is the frequency table of Taiwanese aboriginal teachers in junior school between their age group and sex group. It shows both of female and male Taiwanese aboriginal teachers in junior high school falls in the age group of 35 to 39 has the highest percentage and age of 55 years old or above is the lowest. The female Taiwanese aboriginal teachers in junior high school their age are below 40 years old shows relatively more than male teachers.

Table 2. Frequency table of age group

Age group	Frequency	Percent (%)
22-29	62	16.4
30-34	86	22.8
35-39	88	23.3
40-44	37	9.8
45-49	51	13.5
50-54	41	10.8
55 above	13	3.4
Total	378	100.0

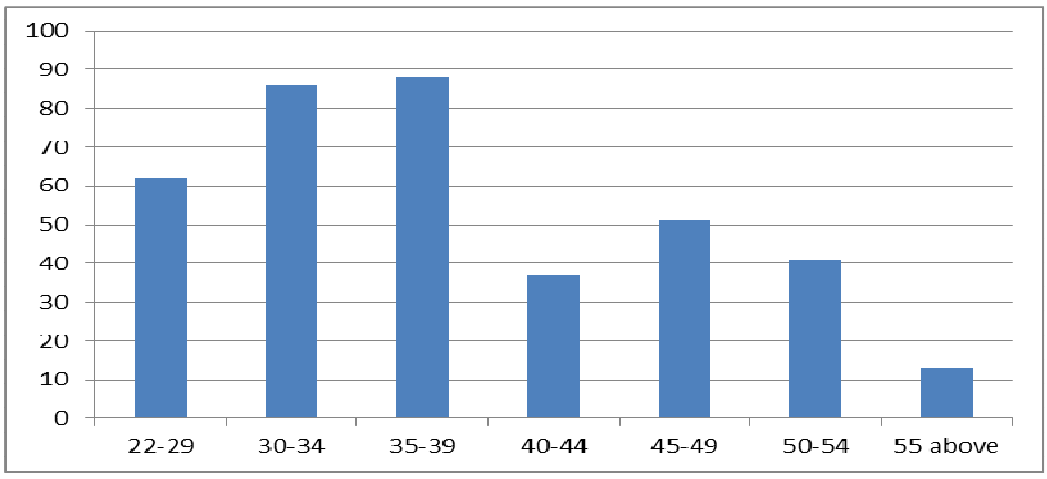

Figure 3. Bar graph of age group

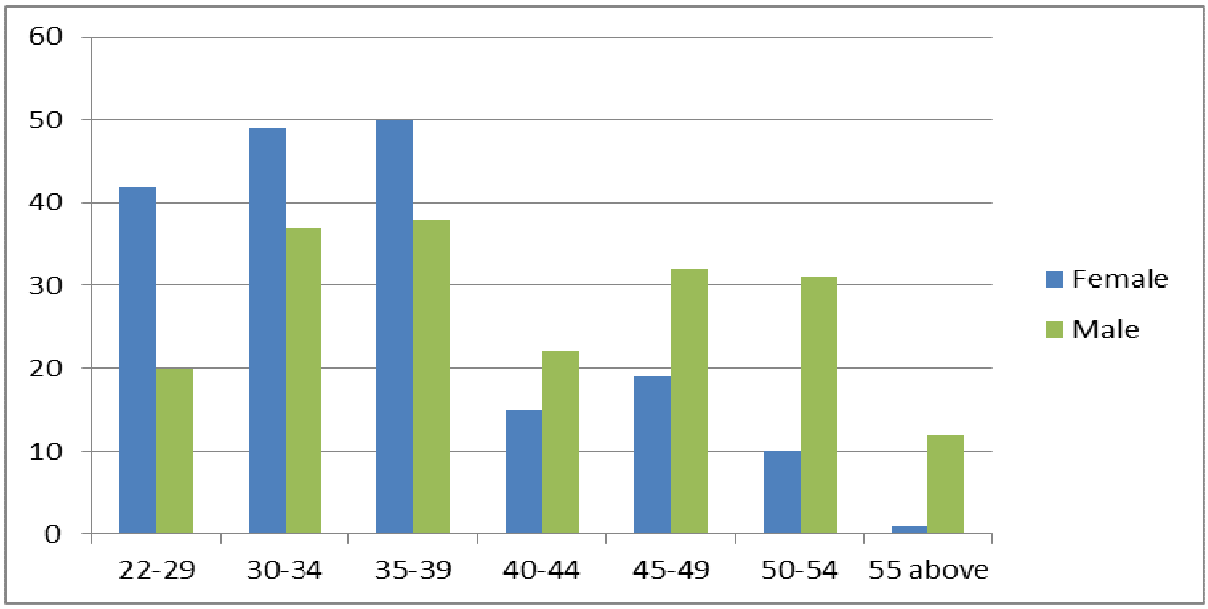

Figure 4. bar graph of age group and sex

Table 4 is the cross table for age group and sex. It shows the expected count and observation value is about the same for Taiwanese aboriginal teachers in junior school between their age group and sex group. Table 5 shows the chiq-square test for testing the relationship between age group and sex. We found there is a real relationship between age group and sex for Taiwanese aboriginal teachers in junior high school so we should add their interaction as a model effect. The parameter for this effect quantifies that relationship.

From the Table 6, it shows we have strong evidence that the ratio of the odds a 22-29 years old female aboriginal teachers in junior high school to the odds male is exp(2.849)=17.27; the ratio of the odds a 30-34 years old female aboriginal teachers in junior high school to the odds male is exp(2.398)=11.00; the ratio of the odds a 35-39 years old female aboriginal teachers in junior high to the odds male is exp(2.392)=10.94.

Table 3. Frequency table of Sex by age group

	Sex				
	Female		Male		
Age group	No. of teacher	Percentage	No. of teacher	Percentage	Total
22-29	42	67.7%	20	32.3%	62
30-34	49	57.0%	37	43.0%	86
35-39	50	56.8%	38	43.2%	88
40-44	15	40.5%	22	59.5%	37
45-49	19	37.3%	32	62.7%	51
50-54	10	24.4%	31	75.6%	41
55 above	1	7.7%	12	92.3%	13
Total	186	----	192	-----	378

Table 4 Cross table for age group and sex

		sex		
		Female	Male	Total
22-29	Count	42	20	62
	Expected Count	30.5	31.5	62.0
	% of Total	11.1%	5.3%	16.4%
30-34	Count	49	37	86
	Expected Count	42.3	43.7	86.0
	% of Total	13.0%	9.8%	22.8%
35-39	Count	50	38	88
	Expected Count	43.3	44.7	88.0
	% of Total	13.2%	10.1%	23.3%
40-44	Count	15	22	37
	Expected Count	18.2	18.8	37.0
	% of Total	4.0%	5.8%	9.8%
45-49	Count	19	32	51
	Expected Count	25.1	25.9	51.0
	% of Total	5.0%	8.5%	13.5%
50-54	Count	10	31	41
	Expected Count	20.2	20.8	41.0
	% of Total	2.6%	8.2%	10.8%
55 above	Count	1	12	13
	Expected Count	6.4	6.6	13.0
	% of Total	.3%	3.2%	3.4%
Total	Count	186	192	378
	Expected Count	186.0	192.0	378.0
	% of Total	49.2%	50.8%	100.0%

Table 5 Chi-square test for age group and sex

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	35.733[a]	6	.000
Likelihood Ratio	38.143	6	.000
Linear-by-Linear Association	33.542	1	.000
N of Valid Cases	378		

a. 0 cells (.0%) have expected count less than 5. The minimum expected count is 6.40.

Table 6 parameter estimates

					95% Confidence Interval	
Parameter	Estimate	Std. Error	Z	Sig.	Lower Bound	Upper Bound
Constant	2.526	.283	8.930	.000	1.971	3.080
22-29	.495	.359	1.379	.168	-.209	1.198
30-34	1.099	.327	3.364	.001	.458	1.739
35-39	1.125	.326	3.456	.001	.487	1.763
40-44	.588	.353	1.666	.096	-.104	1.279
45-49	.956	.333	2.871	.004	.303	1.608
50-54	.924	.334	2.765	.006	.269	1.579
55 above	0[a]	.	.	.	.	.
Female	-2.120	.864	-2.454	.014	-3.814	-.427
Male	0[a]	.	.	.	.	.
[22-29] * [Female]	2.849	.905	3.149	.002	1.076	4.623
[22-29] * [Male]	0[a]	.	.	.	.	.
[30-34] * [Female]	2.398	.891	2.692	.007	.652	4.144
[30-34] * Male]	0[a]	.	.	.	.	.
[35-39] * [Female]	2.392	.890	2.687	.007	.647	4.136
[35-39] * [Male]	0[a]	.	.	.	.	.
[40-44] * [Female]	1.748	.925	1.889	.059	-.065	3.561
[40-44] * [Male]	0[a]	.	.	.	.	.
[45-49] * [Female]	1.609	.910	1.768	.077	-.175	3.394
[45-49] * [Male]	0[a]	.	.	.	.	.
[50-54] * [Female]	1.022	.935	1.093	.274	-.810	2.854
[50-54] * Male]	0[a]	.	.	.	.	.
[55 above] * [Female]	0[a]	.	.	.	.	.
55 above] * [Male]	0[a]	.	.	.	.	.

a. This parameter is set to zero because it is redundant.

b. Model: Poisson

c. Design: Constant + age group+ sex + age group * sex

IV. Summary

The education outcomes of Taiwanese aboriginal people are the most important indicator of society improvement in Taiwan because of our environments are driven by changes in society, fast growth by science, technology and knowledge development in recent years. Aboriginal people have special culture and historical background so we need aboriginal teachers to give aboriginal students a better quality of education and improving their learning. This study aims to find the relationship between age group and gender of Taiwanese aboriginal teacher in junior high school. The conclusions are as follows:

- We found female Taiwanese aboriginal teachers are only 1.6% more than male who teaching in junior high school.
- The highest percentage of junior high school Taiwanese aboriginal teachers falls in the age group of 35 to 39 and teachers of 55 years old or above represent only 3.4% which is the lowest.
- Both female and male Taiwanese aboriginal teachers in junior high school falls in the age group of 35 to 39 have the highest percentage and teachers of 55 years old or above are the lowest. The female Taiwanese aboriginal teachers in junior high school their age are below 40 years old shows relatively more than male teachers.
- In 2009, the average age of Taiwanese aboriginal teachers in junior high school is 38 and age group of 22-29 to 35-39 has 60 above aboriginal teachers. Although we cannot immediately see the teacher retirement rate existing teacher supply which results in aboriginal teacher education gaps but to concern aboriginal students their learning equity and avoid teacher education gaps in the future, we suggest there is a need to make a long term planning on junior high school aboriginal teacher education sufficient to support l aboriginal education in junior high school.
- There is a real relationship between age group and sex for Taiwanese aboriginal teachers in junior high school.
- We have strong evidence that the female Taiwanese aboriginal teachers are more than male Taiwanese aboriginal teachers in junior high school with age group 22-29 to 35-39.

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