

*The Relationship of Mathematics Learning Achievement, School Life, and Language Ability of Southeastern Asian Female Immigrants' Children in Taiwan*

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**Abstract**

As the number of female immigrants from Southeast Asia increases at Taiwan for these years, and it mean more and more Southeastern Asian female immigrants' children were born in Taiwan. Immigrants' children were disadvantaged due to language, cultural and social interactional conflicts between home and school. This study focus on 519 elementary school students that was include 260 new immigrants' children and 259 residents' children in Taiwan. The data would be analysis with latent growth analysis with three years data. The early mathematics learning achievement was not relative the change of mathematics learning achievement in these three years. The early mathematics learning achievement of new immigrants' children and residents' children was different, but the change of mathematics learning achievement of new immigrants' children and residents' children was not different. New Immigrants' children and residents' children were different in teacher relationship, peer relationship, and language ability. The change of language ability of new immigrants' children and residents' children were different in these three years. Early teacher-student relationship and early peer relationship were helpful for the early mathematics learning achievement of new immigrants' children, but for reduce the gap of mathematics learning achievement between new immigrants' children and residents' children, the elementary school teachers should improve the language first.

Keywords: Immigrants' children, Learning achievement, School life, Latent growth curve model

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## **Introduction**

As the number of female immigrants from Southeast Asia increases at Taiwan for these years, and it mean more and more Southeastern Asian female immigrants' children was born in Taiwan. Immigrants' children are disadvantaged due to language, cultural and social interactional conflicts between home and school (Akar, 2010). Usually, students whose native language is different from the language used for the instruction belong to the minority or immigrant groups that are economically disadvantaged compared to the other students (Mohammadpour, 2013). Immigrant parents who speak a foreign language often have less cultural capital to share with their children, weaker relationships with their children's teachers and less understanding of school norms. Immigrants' children often have weaker understanding of teachers' and classmates' expectations, which can limit their learning opportunities and yield less learning, compared to native children (Chiu & Chow, 2010).

Some studies pointed out that the learning achievement of new immigrants' children were not as well as residents' children, especial in language learning (Mohammadpour, 2013; Akar, 2010; Chiu & Chow, 2010; Ho, 2006). But some studies supported that the learning achievement of new immigrants' children were the same as residents' children in school (Hsiao, 2005; Ko, 2004; Wang, Wen, Hsieh, Huang, Huang, Chen, Chen, Tseng, & Liao, 2006; Ministry of Education, 2005).

Traditional data analysis only focused on single data in one time, and it is difficult to find the effect of variable change. Methods of latent growth curve analysis had emerged as a versatile tool for studying longitudinal change, and it was applied in many research areas. The purpose of this study was to investigate Southeastern Asian female immigrants' children's language learning achievement, teacher-student relationship, peer relationship, and environmental perception, and compare with residents' children with latent growth analysis for the effect of the change of school life in three years.

### **The Teacher-student Relationship**

The teacher-student relationship is the interaction of teachers and students. The interaction of students and teachers is one of the important processes of children's learning. The interaction of students and teachers is not only for learning, but also for the transpose of the values of life and learning attitude. Teachers should maintain an effective learning and efficient learning environment, and a good teacher-student relationship (Yang, Tsai, & Ho, 2013). Elementary schools, teachers, students, and parents or guardians can improve teacher-student relationships and communications with information system for improve students' learning achievement (Chen, & Cheng, 2013). A close and intimate teacher-student relationship is helpful in school learning (Lai, & Xue, 2012).

Increase the quality of relationships between teachers and students would helpful in the ability of learning (Shen, McCaughtry, Martin, Fahlmann, & Garn, 2012). Most tutors think new immigrants' children are great, and are good in teacher-student relationship. Chen (2005) adopted purposive sampling to select 331 southeastern Asian female immigrants' children from third-grade to six-grade in the academic year of 92, and find Asian female immigrants' children are well in teacher-student relationship. Nurturing quality relationships between and among both teachers and

peers may hold promise for enhancing learning (Shen, McCaughtry, Martin, Fahlmann, & Garn, 2012). Teachers' attitude is helpful in the success of the students' performance (Othman, & Leng, 2011).

Not the same as above studies, Chin and Yu point out that the children of Southeast Asian immigrants gained significantly lower scores for academic performance and teacher-student relationship than did the adolescents of native Taiwanese mothers (Chin, & Yu, 2008). After interview four southeastern Asian female immigrants' children, Chen (2005) point out that immigrants' children are weak in teacher-student interaction.

### **The Peer Relationship**

The socialization of children is not only dependent on the assist of parents, but only also peer group. Children can learn social skills, establishment of self-concept, and get a sense of security and comfort with the interaction of friends or classmates. In a school, students all come from different family, and their socioeconomic background, habits, and concept are different. In the process of intricate interaction, secondary peer group be formed gradually. If the children adjustment well in the environment, it is helpful in socialization for children. If the children adjustment not well and conflict in the environment, it would become the obstacles on the children's school life.

Increase the quality of relationships between peers may hold promise for enhancing learning (Shen, McCaughtry, Martin, Fahlmann, & Garn, 2012). Peers' understanding is helpful in the success of the students' performance (Othman, & Leng, 2011). Although the computer-assisted learning environment could help students to learn more quickly and conveniently, it is better for students to learn with peer relationship (Huang, & Liu, 2012).

Summarize, the school life include children's interaction with teachers and peer group in the learning environment. This study was focus on the new immigrants' children's teacher-student relationship, pear relationship, and environmental perception.

### **Materials and Method**

This study focused on the mathematics learning achievement, school life, language ability of Southeastern Asian female immigrants' children. The research framework was as Figure 1. The school life included teacher-student relationship, peer relationship.

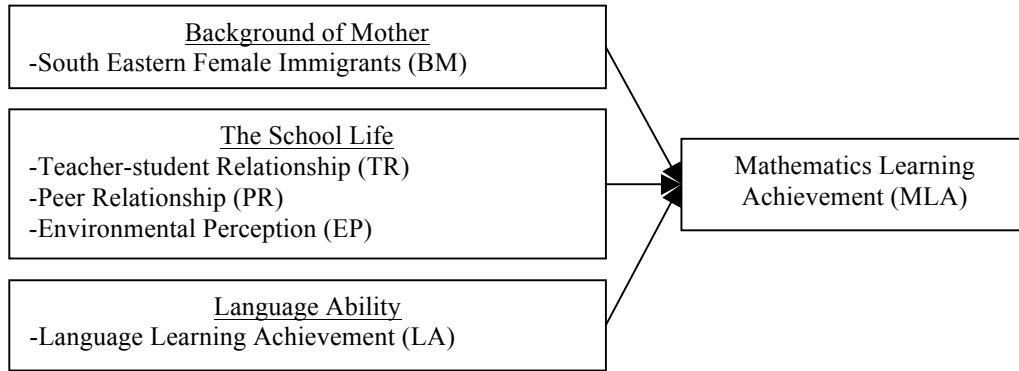


Figure 1: Conceptual framework.

### Research Data

The research data was obtained from Wu's study (2010) in the Survey Research Data Archive (SRDA) provided by the Academia Sinica in Taiwan. Wu's study was finished in July 31, 2007, and built the database of "The transected and longitudinal study of the southeast Asian immigrant women's parent-teacher interaction, children's self-efficacy, and school life in Taiwan". The research data was parts of this database.

The research data was got from three highest degree of urbanization regions that high ration of the number of new immigrant women marriage accounted for the proportion of total marriages in 2003 in Taiwan: New Taipei City, Taoyuan County, and Taichung City, and the three lowest degree of urbanization regions that high ration of the number of new immigrant women marriage accounted for the proportion of total marriages in 2003 in Taiwan: Yunlin County, Pingtung County, and Penghu County. 150 southeastern Asian female immigrants that children study in primary school were sampled in these six regions. The number of residents was the same as the number new immigrants in each region. The data was got one time one year in three years from 2005 to 2007.

There are 1554 records that include 777 new immigrants' records and 777 residents' records in Wu's database (2010). This study focus on 519 records that without missing value in 3-year mathematics learning achievement, and the score of learning achievement was between .20 to .80 for remove extreme values (the overall learning achievement range was from .00 to 1.00). The missing value in these 519 records would be estimate with expectation-maximization (EM) in IBM SPSS 22.

The learning achievement in Wu's study (2010) was calculated with Equation 1. It was converted into the relative position of each subject's rank in the class. The mathematics learning achievement (MLA) and language learning achievement (LA) was be transform from the rank in the class to the score of learning achievement with Equation 1. It could avoid the effect of class sizes on the rank.

$$LA = 1 - \frac{\text{Rank}}{\text{Class Size}} \quad (1)$$

## Research Tools

The school life included teacher-student relationship, peer relationship (Wu, 2010). The questionnaire of school life was being built in Huang's study (Cortina, 1993).

Items for the teacher-student relationship (TR) were as Table 1. There were 4 items for TR. The questionnaire was answered with 5 Likert scale for measuring the relationship of the interaction of teachers and students in campus. TR is the attitude of interaction of teachers and students. The more scores mean the more positive attitude of teacher-student relationship.

Table 1: Items for the teacher-student relationship (TR).

Item	Questionnaire
TR01	I often get the teacher's praise.
TR02	I will take the initiative to help the teachers.
TR03	I like to talk with teachers.
TR04	When teacher quiz me, I would answer seriously.

Items for the peer relationship (PR) were as Table 2. There were 8 items for PR. The questionnaire was answered with 5 Likert scale for measuring the relationship of the interaction of classmates and classmates in campus. PR is the attitude of interaction of students and students. The more scores mean the more positive attitude of peer relationship.

Table 2: Items for the peer relationship (PR).

Item	Questionnaire
PR01	I am willing to share everything with classmates.
PR02	When I'm in trouble, my classmates would help me.
PR03	I would play with classmates.
PR04	It is funny that play with classmates.
PR05	It makes me happy that live together with classmates.
PR06	The classmates would like let me join in play game.
PR07	I would like to work together with classmates.
PR08	Classmates would like to work together with me.

The scale reliability of the questionnaire, mean, and variance in this study was as Table 3. The Cronbach's  $\alpha$  of TR and PR all above .70, and they were good in internal consistency (Huang, 2005).

Table 3: Scale Reliability of the questionnaire in this study.

Scale	N	Mean	Variance	Cronbach's $\alpha$
The teacher-student relationship (TR).	4	2.53	.16	.70
The peer relationship (PR).	8	3.13	.09	.93

## Methodology of Data Analysis

The data analysis methodology in this study was combining the time-oriented factors and latent variable. The research data was tested the trend of average change in longitudinal study with growth curve model and average structure analysis. This study would focus on one factor that changed or growth with time. How the effect of research variables on the starting average and the direction of the trajectory of the target variable would be tested with the covariance analysis of growth curve model that include.

First, the relationship of early (or initial) state and the change with time of mathematics learning achievement would be tested with the intercept and slope of growth curve model of language learning achievement. Second, the effect of the teacher-student relationship, the peer relationship, and the environmental perception on language learning achievement would be tested with the growth curve model of language learning achievement.

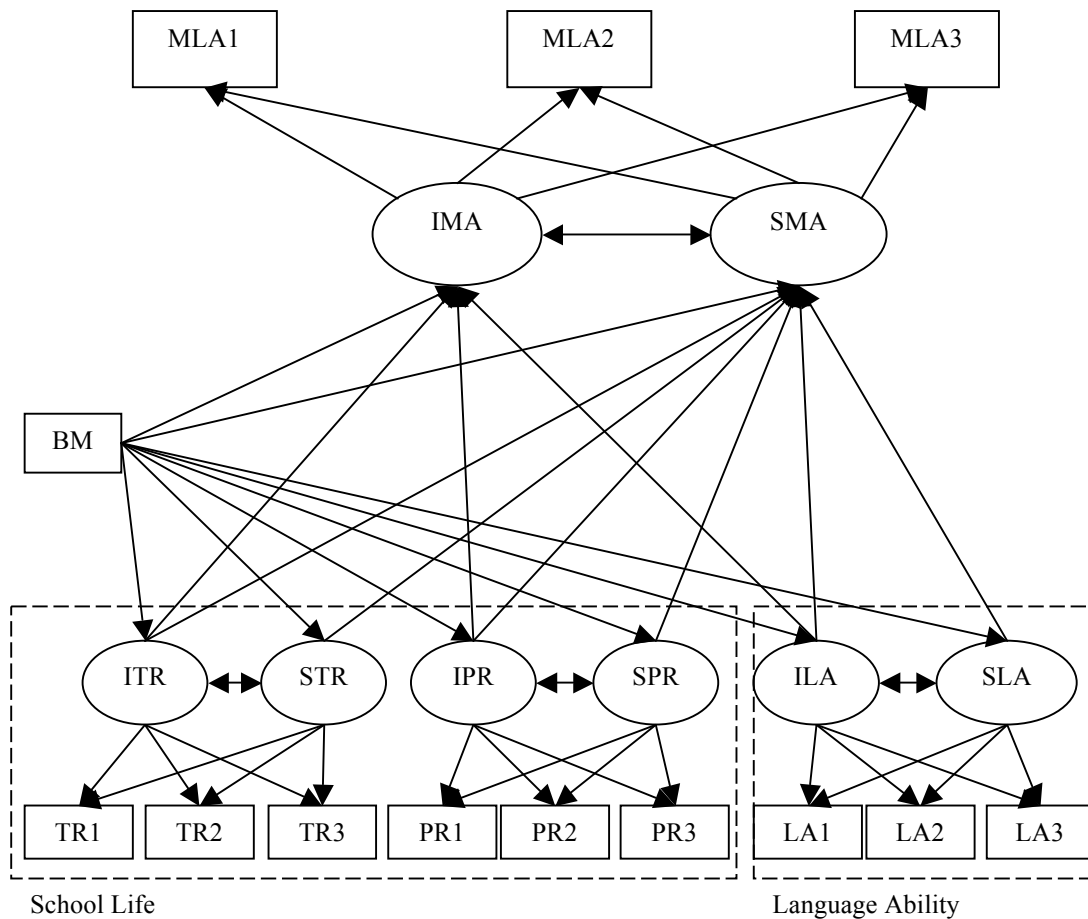


Figure 2: The latent growth model in this study.

The latent growth model in this study was as Figure 2. The data of mathematics learning achievement were got in 3 years (one time in one year) for building the latent variable of intercept and slope (IMA and SMA) of 3 time points of mathematics learning achievement (MLA1, MLA2, and MLA3), and the trace of language learning

achievement in 3 years can be shown with the IMA and SMA in Figure 2. The change rate and direction of mathematics learning achievement can be tested with IMA and SMA.

For testing the effect of the teacher-student relationship, the peer relationship, and the language ability on mathematics learning achievement in different time, they all be build the latent variable of initial state (ITR, IPR, and IMA) and the change (or growth) (STR, SPR, and SMA) based on 3-year data (TR1, TR2, TR3, PR1, PR2, PR3, LA1, LA2, and LA3).

The data would be analysis with Mplus 7.0 and Stata 12. The fit situation of theoretical model and research would be shown with goodness of fit statistics, and the result would be shown with completely standardized solution.

## Results

Data analysis applies a multi-step approach in this study. First, the measurement model was tested by subjecting the measures to a series of confirmatory factor analyses. Second, a structural equation model with moderating variable was developed to test the hypotheses.

The summarization of the research data in this study was as Table 4. There were 519 primary school students in this study, and it included 210 male elementary school students (40.46%) and 209 female elementary school students (40.27%). 260 of them were southeastern Asian female immigrants' children (50.10%), and 259 of them were residents' children (49.90%). About the nationality of the mother, 259 of them were Taiwan (49.90%), 60 of them were Vietnam (11.56%), 139 of them were Indonesia (26.78%), 14 of them were Thailand (2.71%), 1 of them were Malaysia (.19%), 16 of them were Philippines (3.08%), 30 of them were Myanmar (5.78%).

Table 4: Data Summarize of this study.

Variable		Frequency	Percent (%)
Gender	Male	210	40.46
	Female	209	40.27
	Missing	100	19.27
Background of mother	New Immigrants	260	50.10
	Residents	259	49.90
The nationality of the mother	Taiwan	259	49.90
	Vietnam	60	11.56
	Indonesia	139	26.78
	Thailand	14	2.71
	Malaysia	1	.19
	Philippines	16	3.08
	Myanmar	30	5.78
City	New Taipei City	57	10.98
	Taoyuan County	87	16.76
	Taichung City	80	15.41

	Yunlin County	119	22.93
	Pingtung County	58	11.18
	Penghu County	118	22.74
Total		519	100.00

Table 6, 7, 8 presents factor loading and other metrics for the item measures as well as reliability and validity measures. Hair, Anderson, Tatham, and Black (1998) suggest that in a sample of 150 respondents. Chi-square test of model fit was 645.13 (df=53, p-value<.01), RMSEA was .15, CFI was .75, TLI was .63, and SRMR was .14.

### Mathematics Learning Achievement

The result of relationship of the early (intercept) and the change (slope) was as table 5. The early mathematics learning achievement (IMA) was not relative the change of mathematics learning achievement (SMA) in these three years. The early mathematics learning achievement (IMA) of new immigrants' children and residents' children was different, but the change of mathematics learning achievement (SMA) of new immigrants' children and residents' children was not different.

Table 5: The assessing of measurement model of the language learning achievement in three year.

	F.L.	S.E.	t-value
IMA↔SMA	-.02		.88
BM→IMA	.03*	.02	2.11
BM→SMA	-.01	.01	-1.19

\*: p-value<.05

### The School Life

The result of the effect of school life and language ability on mathematics learning achievement was as Table 6. It could be found that early language ability (ILA) would affect early mathematics learning (IMA), and early language ability (ILA) and the change of language learning (SLA) would affect the growth of mathematics learning (SMA). Besides, early language ability (ILA) would affect the growth of language ability (SLA).

Table 6: The assessing of measurement model of the school life (SL).

	F.L.	S.E.	t-value
ITR→IMA	.02	.03	.57
IPR→IMA	-.02	.03	-.70
ILA→IMA	.54*	.05	11.36
ITR→SMA	-.04	.02	-1.56
IPR→SMA	.03	.02	1.45
ILA→SMA	.10*	.03	3.11
STR→SMA	.07	.06	1.11
SPR→SMA	.05	.04	1.23



SLA→SMA	.70*	.07	9.54
ITR↔STR	.21		-.78
IPR↔SPR	<.01		.01
ILA↔SLA	.20*		-2.59

\*: p-value<0.05

### Background of Mother

New Immigrants' children and residents' children were different in teacher relationship, peer relationship, and language ability (ITR, IPR, and ILA) (Table 7). The change of language ability of new immigrants' children and residents' children were different in these three years.

Table 7: The assessing of measurement model of the background of mother (BM).

	F.L.	S.E.	t-value
BM→ITR	.16*	.05	3.37
BM→STR	-.02	.03	-.64
BM→IPR	.14*	.04	3.37
BM→SPR	.01	.03	.27
BM→ILA	.05*	.02	2.57
BM→SLA	-.03*	.01	-2.59

\*: p-value<.05

### Discussion and Conclusion

The early mathematics learning achievement of new immigrants' children was weak than residents' children. The growth of mathematics learning achievement of new immigrants' children and residents' children was not different. The early language ability would affect early mathematics learning, and early language ability and the change of language learning would affect the growth of mathematics learning. Besides, early language ability would affect the growth of language ability. New Immigrants' children were weak in early teacher-student relationship and peer relationship, and this result was the same as Chiang (2005), Chen and Cheng (2013), Shen, McCaughtry, Martin, Fahlmann, and Garn (2012), and Othman and Leng (2011). The early language ability and the growth of language ability of new immigrants' children was weak than residents' children. This result was the same as Mohammadpour (Mohammadpour, 2013), Akar (2010), Chiu and Chow (2010) and Ho (2006).

Summarized, the different of mathematics learning achievement between immigrants' children and residents' children was come from early mathematics learning achievement. The main factor of mathematics learning achievement for immigrants' children was language ability. Language ability not only affected early mathematics learning achievement, but also the growth of mathematics learning achievement. Early teacher-student relationship and early peer relationship were helpful for the early mathematics learning achievement of new immigrants' children, but for reduce the gap of mathematics learning achievement between new immigrants' children and residents' children, the elementary school teachers should improve the language first.

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