Abstract

Throughout Taiwan youth's schooling years, parental educational strategies are commonly put forth t to ensure better academic opportunities for their children. In addition to school choice and school involvements, parental provision emerges as a unique form of educational strategy in Taiwan. Who choose to practice educational strategies and what are the effects of such practices are the primary interests in this study. The main purpose of this study is to investigate the types of educational strategies that parents would apply, and further more, the effects of exerting these strategies on students' academic performance will be examined. The data to be used are from a panel study, "Taiwan Youth Project", which has followed-up adolescents' educational experience consecutively in their secondary school years in Taiwan, with both data collected from students and their parents. Several path models are constructed and compared. In general, parents in Taipei City are more engaged in educational strategies. The results suggest that there is a gender difference in the practice parental educational strategies. Parents' social-class backgrounds have effects on the practice of educational strategies too, but the patterns are different across areas. Generally, the practice of educational strategies has positive effects on students' academic performance, but the efforts pay back more in Taipei County.

Parental Educational Strategies and Students' Academic Performance： A Path Analysis

1. Introduction

Throughout Taiwan youth's schooling years, parental educational strategies are commonly put forth to ensure better academic opportunities for their children. School involvement has been such a strategy applied by most contemporary parents and its effect on consequent academic performance has increasingly drawn scholars and policy makers' attention. （Keith, 1987, 1993; Muller, 1995）Various kinds of school–parent partnership programs have been growing in recent school reform efforts. Another educational strategy that would be deliberatively pursued by parents here in Taiwan is choosing a school with good reputation by transferring their children to a better school district, or sending them to a private school.

In western societies, various school-choice plans have been developed for different family needs or interests.（Anderson, 1992; Bradley, 1996; Goldberg, 1993）In Taiwan, within nine-year compulsory education, schools are designated according to the districts of household registration. The rate of entering public or even top senior high schools becomes a key index of school choice. Under the high competition of entering prestigious senior high schools, sometimes school arrangements have to be made as early as in elementary school stage.

Despite the commonness of educational strategies practiced, the effects on academic performance are either inconsistently supported or lack of empirical findings in previous studies. Except for the causal relationships between parental educational strategies and students' academic performance, "who chooses and why?" has become a most concerned issue lately. The main purpose of this study is to construct a path diagram of the causes and effects of parental educational strategies.

The types of educational strategies that parents would apply will be investigated across social class and urban-rural settings. Furthermore, the effects of exerting these strategies on students' academic performance will be examined. The data to be used are from a panel study, "Taiwan Youth Project", which has followed-up consecutively adolescents' educational experience in their secondary school years in Taiwan, with both data collected from students and their parents. Urban and rural parental educational strategies practiced will be compared in this study.

2. Causes and Effects of Parental Educational Strategies

Parental educational strategies are regarded as the explicit efforts that exerted by parents to facilitate their children's educational results. Academic performance has been the most prominent result concerned and studied. In searching for the degree of influence that parents would have on students' academic performance, previous studies have tried to examine multiple factors that take effects on students' learning via the forces driven by parents implicitly or explicitly.（NICHD, 2004; Chen et al.,1996; Lee, 1997） Among all types of parental efforts put on their children to enhance their academic performance, the education strategies are the most tangible ways revealing such attempts.

Parental Involvement

Parental involvement has been believed to play a role in improving students' school learning, but the term used may have various meanings, such as parental education aspiration and expectation, （Bloom, 1980; Goyette, K & Xie, 1999; Seginer, 1983） participation in school activities,（Cervone & O'leary, 1982; Epstein, 1991） a home environment that supports learning, (Majoribanks, 1979, 1983) and communication between parents and children about school experience.（Christenson et al., 1992; Epstein, 1991）In previous studies, it is pointed out that the effect of parental involvement on students' academic performance may vary with the age of the students,

parental background, the definitions of parental involvement and measures of academic performance as well. （Keith, 1991; Muller, 1995）The positive effects of parental involvement on students' academic performance have been reported more consistently for elementary-age students, （Esptein, 1991; Stevenson & Baker, 1987）but is inconsistent for secondary school students.（Keith, 1993; Bogenschneider, 1997; Muller, 1995）

It is noticed that the relation between parental involvement and children's school success may vary with the person and the environment. Various forms of parental involvement have been tested on school achievement of secondary school students by maternal employment status, and the effects are found dissimilar. The results show that not all kinds of parental involvement work as the positive predictors on students' academic performance as they are intended. Parental school involvement, measured as PTO participation, parents contact school and parent volunteers at school, shows negative effects on secondary school students' academic performance significantly.（Muller, 1995）However, the positive effects of parental school involvement has been reported in predicting school grades for older age students. （Bogenschneider, 1997）Despite the inconsistence in research, parental school involvement has been encouraged under the proclamation of "bring parents back to the fold."（Bush, 1991）More parent-involved programs are provided by teachers and school administrators.

School choice

Who tends to apply educational strategies among parents is another interesting question but rarely answered. In a recent study, how social class influences parental educational strategies in Chinese immigrant families has been examined. （Louie, 2001）In the qualitative research work, it is revealed that Chinese parents have the same high educational expectations for their children, but differences in the resources and educational strategies pursued. The strategies on school choice for their children

are generally regarded as an important “investment” to gain better opportunities in postsecondary education. But there is a clear line dividing the educational strategies developed by parents’ with different social-class backgrounds.

For the suburban middle-class parents, private school is an ideal choice for their children. Otherwise, moving the whole family into the best public school district for better education is another alternative. For their urban middle or working-class counterparts, unable to afford the high tuitions of private schools, nor the high cost of estates in reputed school districts, these parents, with the same educational aspiration for their children, would seek to activate their social network and enroll their children in a better-rank school by using their acquaintance’s address in a more up-scale neighborhood. The latter practice of “school arrangement” more resembles the educational strategies that parents would apply in Taiwan. In a restrict sense, parents in Taiwan are not released with much option of “school choice”. Schools are designated according to the household registration. Even choosing private schools takes some good luck to be randomly drawn. However, goals can be reached by various ways of arrangements. To fulfill the official requirements, the most common and costless way is transferring household registration by attaching to some acquaintance’s household within the desired school districts.

In fact, the notion of “school choice” is not an innovative strategy in contemporary societies. It can be traced back to ancient time in Chinese society that the great Chinese philosopher Meng Tzu ‘s story. To find him a better learning environment, his mother moved three times in search of a suitable neighborhood. Preparing children with better learning environment has rooted in parents’ conception.

Nowadays, even students’ educational opportunity has been assured by the compulsory education policy, the practice of parental education strategies does not recede. The research on parental educational strategies in Taiwan has called more

attentions just in recent years. As a tangible form of social capital, the engagement in educational strategies is found to be associated with the parental and ecological characteristics. For those families in a more disadvantaged area, lack of educational resources, unstable school conditions, parents are either more likely to engage in educational strategies, or not intending anything at al. （Lean & Huang, 2004）

Who are more motivated to practice educational strategies? In the western literatures, the discussion has been more focused on the differentials of ethnic and religious backgrounds. In Taiwan, a few studies on school choice have initially suggested that both family characteristics and schools' structural and functional conditions would determine the probability of choosing a private school or not. Moreover, the factors influencing school choice are different between elementary and secondary schools.（Wu, 1999）

The causes and effects of parental educational strategies have been built by pieces of evidence. In this study, it is attempted to examine the causal relationships of parental educational strategies in a whole picture. Rather than the concept of "school choice" often used in previous studies, school arrangements by parents will be one of the foci in the following analysis. It is reported that there are approximately 25% of students who do not enroll in their designated schools.（Lean & Huang, 2004） However, only by observing the trans-district schooling may conceal some other arrangements made by parents, such as moving the whole family into the preferred school districts. The concept of school arrangements will better depict the situation in Taiwan.

Another unique educational strategy in Taiwan is parental domestic provision for children to facilitate their school success. The kinds of provision that parents could offer may be beyond people's imagination except for the highly inspired Chinese parents. In this study, a path model will be constructed to examine the causal

relationships among social classes, parental educational strategy and academic performance.

3. Data, Measures and Research Model

The data to be used in this study are from a panel study "Taiwan Youth Project" （the Institute of Sociology, Academia Sinica, Taiwan）. This project is a longitudinal research, beginning from 2000 and scheduled to collect eight-wave of survey data. Samples consist of two-cohort of junior high school students, who were in their 1st-grade and 3rd grade when in 2000, for the purpose of comparing cohort difference in school experiences before and after the change of channeling to senior high schools. In addition to students' surveying, data are also collected from their parents for some certain waves. All student samples are selected on a school-based, multi-stage stratified sample scheme. The first stage is to select sample schools in three areas: Taipei City, Taipei County and Yi-lan County. Secondly, Classes are randomly selected from the sample schools.

In this study, data to be used are from the 1st grade cohort samples when in 2000 (referred as J-1 sample), and most of the measures are taken from the 3rd wave questionnaires. Parents' version of data will be also combined in the analysis. Totally, there are 2696 respondents in J-1 sample.

Variables

Parental educational strategies:

There are three types of educational strategies analyzed in this study. The first strategy is "***school arrangement***", measured as a dummy variable, and the question asked is: "whether your parents have made any of the following arrangements for you to enroll in the current high school?" Arrangements listed include transferring the household registration to a friend or relative's residence, home-staying in a friend or relative's house, buy a house within the district that the current school is designated,

or moving the whole family into the current district. Since there is no private schools selected in the sample, the school arrangements do not include things related to private school choice. This variable is taken from J-1 student's 2nd wave questionnaire. Though most of the other measures are taken from the 3rd wave questionnaires, school arrangement is generally deliberately prepared long before entering the schools and is assumed to be rather invariant across junior school years.

The second educational strategy is ***"school involvement***". It is an index of the degree of parental participation in school activities. This measure is taken from the 3rd- wave parents' questionnaire. Parents are asked: "have you or your spouse ever participate in any of the following school activities during this school year?" Three types of school activities are listed: serving as a volunteer or a committee member in Parents' Association, attending any school activities that hold for parents, or attending any school-inviting activities. The scores are then summed-up by the number of types of activities that parents have participated. The higher the score is, the more degree of parental school involvement is.

The third educational strategy is a unique one and is measured as the average number of hours that parents are in company with the students in studying every day. In this study, it is conceptualized as "***parental companion***". This measure is taken from the 3re-wave students' questionnaire.

These three variables of parental educational strategies play as a dual role in the path model. They serve as the independent variable when predicting later academic performance; however, they also work as the intervening variables between the social class and the academic performance.

Academic performance:

The index of academic performance is a composite estimate by averaging the Scholastic Aptitude Test scores reported by students of their senior high school

ranking categories . This measure is taken from the 4th-wave students' questionnaire. In the path model, academic performance is the final outcome variable, determined by the practice of parental educational strategies directly, and also by the parental social-class backgrounds both direct and indirectly.

Social Class:

Two dimensions of parental social-class backgrounds are measured here. The first one is parental degrees of education. The second one is parental occupation status. The latter is measured as a dummy variable. White-collar workers are coded as "1"; non-white-collar workers coded as "0". Both fathers' and mothers' measures of education and occupation are presented. Rather than constructing a composite index, parental education and employment status are used as single indicators in the path model in this study. Due to the inconsistency and mere evidence in concluding the effects of social class on parental educational strategies in previous research, it is intended to assess the extents of influence of the four indicators on parental educational strategies.

Students' gender is used as the controlled variable in the path model. Male is coded as "1" and female coded as "2". Little attention has been paid on the gender effect on parental educational strategies. However, the difference in educational expectation toward sons and daughters are well documented. Whether the same kind of difference applies to the practice of educational strategies needs further investigation.

Research Model

Figure 1 presents the research model of the path analysis.

Figure 1 about here

There are five exogenous variables in this model. Each of them is expected to be associated with three indicators of parental educational strategies, and academic

performance is predicted by parental social- class backgrounds via parental educational strategies.

The following hypotheses will be tested in the path model:

1. There is a gender difference in the practice parental educational strategies;
2. Parental with higher education level are more likely to engage in educational strategies;
3. White-collar parents are more likely to engage in educational strategies;
4. The practice of parental educational strategies has a positive effect on students' academic performance;
5. There is a rural-urban difference in practicing parental educational strategies;
6. The effects of parental educational strategies on students' academic performance differ among the urban and rural settings.

4. Results

The descriptive statistics of variables and cross-tabulation of selected variables and area are shown in Table 1 and Table 2, respectively.

Table 1 about here

Table 2 about here

As presented, there are some differences in the proportions of educational-strategy practicing among Taipei City, Taipei County and Yi-lan County. Overall, parents in Taipei City seem more enthusiastic in all three types of educational strategies. They are more likely to involve in school arrangement, school activities and spend more time in companion with their children in studying. Particularly, parents in Taipei City show more engagement in school arrangement and parental companion than the other two areas. Parents in Yi-lan County do practice some certain kinds of educational strategies more than parents in Taipei County. They are more apt to make school arrangements for their children, and on the average, spent a

little more time in companion with their children in studying. As to Taipei County, school arrangement and parental companion are less applied by parents; however, they do participate in school activities more frequently. Not surprisingly, students in Taipei City show the best academic performance on average among the three areas.

The estimates of path coefficients of total sample and three sub-sample by areas are presented in Table 3. In total, there are four path models tested here.

Table 3 about here

In each path model, there are three β coefficients to be estimated; that is, the three causal effects of parental educational strategies on academic performance. The two-digit suffixes go with β represent the number ordered of four dependent variables to be predicted in the path model. They are numbered from 1 to 4, in the order of " school arrangement ", " school involvement ", " parental companion " and " academic performance ". In this part, the three variables of educational strategies serve as the predictors of academic performance. Therefore, the 4th dependent variable--academic performance, are predicted by the 1st intervening variable--school arrangement (4 on 1→ 41), the 2nd intervening variable—parental involvement (4 on 2→ 42), and the 3rd intervening variable—parental companion (4 on 3 → 43), denoted as β_{41}, β_{42} and β_{43}, respectively.

Likewise, the γ coefficients are the estimated path coefficients of the causal effects of five exogenous variables on four dependent variables. The five exogenous variables are all assumed to have direct effects on three types of educational strategies, but only two parents ' education variables are assumed to have direct effects on academic performance. Therefore, there are 15 path coefficients to be estimated between five exogenous variables and three educational-strategy variables and plus two path coefficients of parental education on academic performance. Totally, there are 17 γ coefficients to be estimated in each path models. Among the exogenous variables, it is assumed that there are

correlations between father's education, mother's education, and their education with their own occupation. The estimates of the correlation coefficients are denoted as ϕ in the path models. (See the research model in Figure 1)

Three statistics are used as the model fitting indices, and they are X^2, GFI and RMSEA. If the data fit the model perfectly, then X^2 equals zero, GFI equals 1, and RMSEA equals zero. As shown in Table 3, all four path- models have satisfactory goodness of model fit. However, there are differentials in the significance of predictors across three areas.

If all samples are pooled, three parental educational strategies have different effects on students' academic performance. Among all, school involvement predicts better than the other educational strategies. Parental companion does not show significant effect on students' academic performance. School arrangement also shows positive effects on academic performance, the significance is on the margin. Next, the γ coefficients tell how the parental social-class backgrounds would have effects on the practice of educational strategies. First of all, the practice of educational strategies significantly differs by students' gender. But only shown in school involvement and parental companion, not significant in school arrangement. Parents of females students involve less in school activities and take less time in companion. Secondly, parents' education has mixed effects on strategies applied. School arrangement is significantly affected by both father's and mother's education. The more educated parents are more likely to make school arrangement for their children. However, both parents' education does not significantly affect the degree of school involvement. And parental companion is only significantly affected by father's education.

The effects of parental employment status then show a distinct effect on educational strategies. Basically, mother's employment status does not influence the practice of educational strategies. Only father's employment status is a significant predictor in

school arrangement and school involvement. White-collar fathers are more engaged in educational strategies than non-white-collar fathers.

When observed within each area, it is another story. In Taipei City, The only educational strategy significant in predicting students' academic performance is parental school involvement. Both school arrangement and parental companion do not show such significant effects. Gender differences are significant in school involvement and parental companion. Father's education seems a stronger predictor influencing educational strategies. Mother's education has no significant effects on all three educational strategies, neither does mother's occupation.

In Taipei County, all three educational strategies are significant in predicting students' academic performance. Gender difference only shows in school arrangement, not in school involvement or in parental companion. Both parents' occupations have no effect on any types of educational strategies. Like observed in Taipei City, Mother's education in Taipei County does not significantly influence any practice of educational strategies. Father's education has a positive effect on school arrangement.

In Yi-lan County, School arrangement and school involvement show significant effects on students' academic performance. Parents with high education are more engaged in school arrangement. Parents' occupations both influence significantly on school involvement. Mother's education also has an effect on school involvement, but father's education does not.

Comparing the different patterns of path models in each area, it seems that educational strategies pay back more in Taipei County. Despite that more parents make school arrangement for their children, spend more time in companion with their children in studying in Taipei City, the returns seem not satisfactory. For parents in Yi-lan County, the domestic provision is not as effective as the resources out-reached. Generally speaking, fathers' social-class characteristics are better predictors of

educational strategies than mothers'. Education seems to work better than occupation in predicting educational strategies. Nevertheless, mothers' occupation status functions better in Yi-lan County than the other two areas.

The differentials are observed in previous path models. However, in the complex path models, the effects of single indicators across sub-samples are not appropriately compared without holding other covariates fixed. Does parental companion really have an effect in Taipei County but not in Taipei City or Yi-lan? With other variance uncontrolled, it is too early to make a conclusion. To make such comparisons, the effects of other covariates should be fixed at the same level, and only set the indicators to be compared free. Consequently, whether the difference exists can be clearly observed. The coefficients compared are selected from the results shown in Table 3. From which, indicators show difference in predicting effects across areas are the main concerns in the next step of model comparisons. If the patterns are identical in each area, no further comparison will be made. Table 4 shows the results of comparison of path models.

Table 4 about here

In Table 4, the main focus concerns are the effects of parental educational strategies on academic performance, and parental social-class backgrounds on the practice of educational strategies. From Table 3, it seems that the effect of school arrangement in Taipei City works differently from the other two areas, and the effect of parental companion in Yi-lan County seems different from the other two areas. Therefore, the two coefficients β_{41} and β_{43} will be further tested. The alternative hypothesis, (denoted as Alt in the table) will be tested against the baseline model that assuming the effect of a particular indicator is all equal in three areas. (A=B=C, meaning effect in Taipei City equals the effect in Taipei County and Yi-lan County). The statement in alternative model is based on the results shown in Table 3.

If the alternative model is better-fitted than the baseline model, there should be a significant decrease in χ^2 at least 3.84 at 1 degree of freedom difference. The significance of χ^2 change will decide whether the baseline model is rejected or retained.

For the two β coefficients tested here, both alternative models show significant changes in χ^2. As a result, the baseline models of equal-effect assumption are rejected. The effects of school arrangement on academic performance in Taipei City differ from Taipei and Yi-lan Counties. And the effects of parental companion in Yi-lan County differ from Taipei City and County.

For the γ coefficients, the comparisons are focused on the effects of parental social-class backgrounds on the practice of educational strategies. The effects of γ_{32} is tested that whether fathers ' education affects parental companion differently between Taipei City and other two areas. The change in χ^2 attains the significant level. Therefore, the alternative model of unequal effects is chosen. The coefficients γ_{13} and γ_{23} are tested that whether the effects of mothers ' education on school arrangement and school involvement are different across three areas. The results suggest keep the baseline models that there are no significant effects of mothers ' education on school arrangement and school involvement in all three areas. The coefficients γ_{14} and γ_{24} are tested that whether the effects of fathers ' occupation on school arrangement and school involvement are different across three areas. The results show that there are no significant changes in χ^2. The baseline models of equal effects are retained. Fathers ' education have positive effects on school arrangement and school involvement in all three areas. Finally, the coefficient γ_{25} is tested. The result suggests the baseline model; that is, mother ' s occupation has no significant influence on school involvement in all three areas.

5. Conclusion and Implication

In this study, two major questions are concerned: who choose to practice educational strategies and what are the effects of such practices on academic performance. Using the panel data collected in three areas in northern Taiwan, several path models are constructed and compared.

Plenty of empirical findings have illustrated the mechanism how parents in rural and urban settings endeavor to foster children's academic performance in their own ways. In the previous studies, the concepts of educational aspiration or social capital are frequently used as the intervening or the mediating factors between parents' social- class characteristics and children's academic performance. In a broad sense, the educational strategies analyzed in this study are the tangible forms of social capital and parental aspiration. They show as the most explicit performance reflecting the parents' inner aspirations and personal networking.

Most of the grown-ups in Taiwan have experienced the pressure of academic competition for the entrance to senior high schools and colleges. When the exam days approach, it is like a battler of all family. Domestic provisions are offered as thoughtful as parents could. The same kind of efforts may be found in the immigrant Chinese family; however, such educational experiences are rarely discussed in the literature. Some empirical findings in this study can contribute to relevant research.

The attempts of practicing educational strategies are self-evident, but it does not always pay back as desired. Is academic success the only goal of such practice? If children perform poorly in school, would parents close down any types of domestic provision and not attending any school activities? Or the parents are as persistent as ever in making these efforts regardless of children's academic performance? Further empirical analyses are expected on this issue.

The effects of school involvement have discussed above. It is conceived that

with the urban-rural differentials in school resources and structures, variables on school-side can be further examined when studying the parental school involvement.

Currently, these J-1 samples have moved on to senior high schools. Whether the parental educational strategies would transform in this school stage deserves further investigation. The long-term effects of educational strategies on post-secondary school achievement can be examined in this longitudinal research.

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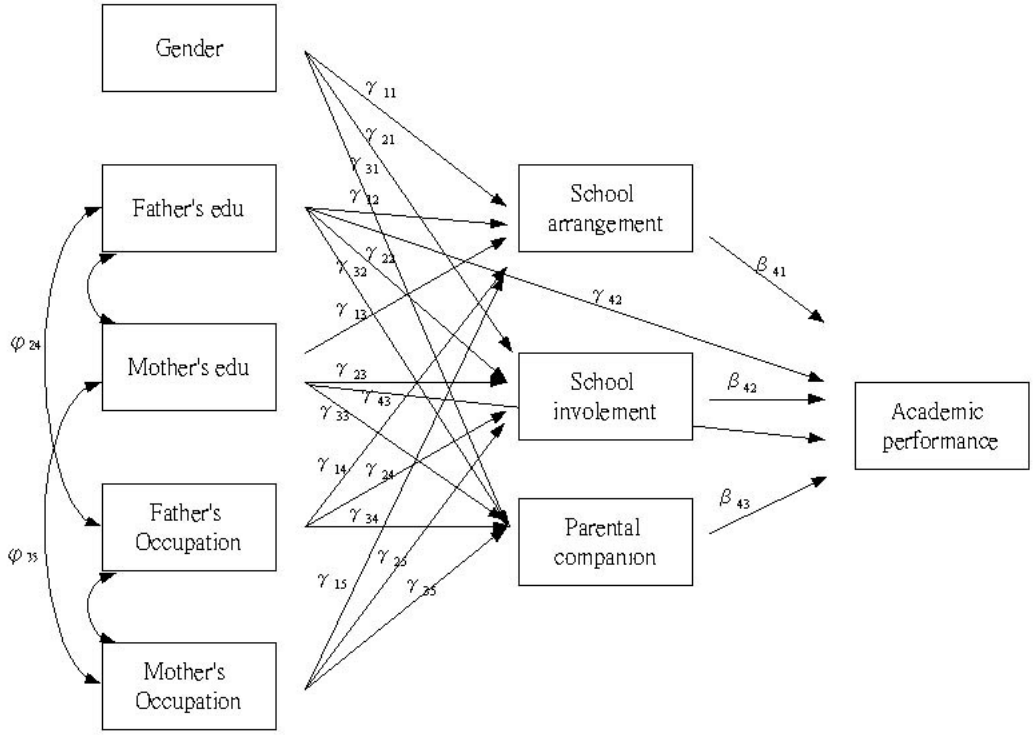

Figure 1. Path analytic Model for Parental Educational Strategies

Table 1. Descriptive Statistics of Variables

Variables	Measures	Percents/means
Gender	1. Male	51.0 %
	2. Female	49.0 %
Father's Education	1. Elementary school and under	17.7 %
	2. Junior high school	27.2 %
	3. Senior high school	24.3 %
	4. Vocational high school	9.9 %
	5. College	6.8 %
	6. University	10.7 %
	7. Graduate school	3.4 %
Mother's Education	1. Elementary school and under	21.4 %
	2. Junior high school	26.2 %
	3. Senior high school	24.3 %
	4. Vocational high school	14.0 %
	5. College	5.6 %
	6. University	7.5 %
	7. Graduate school	1.1 %
Area	1. Taipei City	38.7 %
	2. Taipei County	39.3 %
	3. Yi-lan County	22.0 %
School Arrangements	0. No special school arrangement	72.5 %
	1. Some arrangements have made	27.5 %
School Involvement	Number of types of activities participated	0.8 (0.9)
Parental Companion	Number of hours that parents in company with the students in studying	0.7 (1.5)
Academic Performance	The composite estimate of the SAT scores by the students' senior high school ranking	165.6 (46.0)

Table 2. Area Differentials in Educational Strategies and Academic Performance

	school arrangement	school involvement	parental companion	academic performance
Taipei City	36.0%	0.87	0.83	179.14
Taipei County	20.7%	0.80	0.61	162.22
Yi-lan County	24.9%	0.66	0.68	148.09

Table 3. The Standardized Path Coefficients by Area

	Total	Taipei City	Taipei County	Yilan County
β_{41}	.04+	-.01	.08*	.07*
β_{42}	.10*	.12*	.10*	.04*
β_{43}	.01	-.02	.05*	.00
γ_{11}	-.03	-.01	-.05*	-.02
γ_{21}	-.04+	-.06*	-.02	-.08*
γ_{31}	-.04*	-.06*	-.04	-.02
γ_{12}	.09*	.07*	.07*	.10*
γ_{22}	.00	-.03	.01	-.03
γ_{32}	.05+	.07*	.00	.04
γ_{42}	-.05+	-.07*	-.04	-.04
γ_{13}	.06*	.02	.06*	.05+
γ_{23}	.00	-.01	-.04	.06*
γ_{33}	.05	.04	.04	.03
γ_{43}	-.02	.02	-.02	-.10*
γ_{14}	.05*	.09*	.03	.01
γ_{24}	.04*	.01	.03	.13*
γ_{34}	-.01	-.01	-.02	.02
γ_{15}	.00	.01	-.02	.00
γ_{25}	.02	.03	.00	.04*
γ_{35}	-.02	-.02	-.02	-.01
ϕ_{23}	.69*	.72*	.60*	.63*
ϕ_{45}	.28*	.72*	.38*	.23*
ϕ_{24}	.06*	.07*	.03*	.12*
ϕ_{35}	.05*	.03*	.06*	.04*
N	2480	941	974	565
χ^2 (4)	90.45（12）	24.60（12）	30.70（12）	54.78（12）
GFI	.99	.99	.99	.98
RMSEA	.05	.03	.04	.08

+ $p < 0.10$; * $p < 0.05$

Table 4. Selected Path Coefficients for Model Comparisons

Model	Description	Taipei City（A）	Taipei County（B）	Yilan County（C）	χ^2	df	$\Delta\chi^2$
β_{41}							
Baseline	A=B=C	.04*	.04*	.04*	1667.5	102	5.1*
Alt	A≠B=C	-.01	.07*	.07*	1662.4	101	
β_{43}							
Baseline	A=B=C	.01	.01	.01	1667.5	102	3.5+
Alt	B≠A=C	-.01	.06*	-.01	1664.0	101	
γ_{32}							
Baseline	A=B=C	.04	.04	.04	1667.5	102	5.3*
Alt	A≠B=C	.11*	.00	.00	1662.2	101	
γ_{13}							
Baseline	A=B=C	.04	.04	.04	1667.5	102	0.6
Alt	A≠B=C	.02	.05*	.05*	1666.9	101	
γ_{23}							
Baseline	A=B=C	-0.1	-.01	-.01	1667.5	102	2.8
Alt	A=B≠C	-.03	-.03	-.05	1664.7	101	
γ_{14}							
Baseline	A=B=C	.04*	.04*	.04*	1667.5	102	2.8
Alt	A≠B=C	.09*	.02	.02	1664.7	101	
γ_{24}							
Baseline	A=B=C	.04*	.04*	.04*	1667.5	102	3.0
Alt	A=B≠C	.02	.02	.11*	1664.5	101	
γ_{25}							
Baseline	A=B=C	.02	.02	.02	1667.5	102	1.5
Alt	A=B≠C	.01	.01	.05	1666.0	101	

+ $p < 0.10$; * $p < 0.05$