

# A Prediction of Reading and Math Performance of Interracial Children: Using Path Analysis

By

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## Abstract

*More than ten percent of elementary children enrolled in Taiwan are from interracial marriages. The purpose of this study is to inquire how teacher's perceived culture impacts these new immigrants' school performance and learning behaviors on reading and math. A path analysis was implemented for this study. A survey was developed and utilized to collect data from 107 elementary teachers. Path analysis assesses Goodness of Fit using a chi square to describe the predictors of learning, cultural, and social behaviors on children's reading and math performance in Taitung, Taiwan. Findings from this study revealed while three behaviors are interrelated, learning behavior was the strongest predictor. However, it cannot operate independently.*

**Keywords:** *Interracial marriage, Reading, Learning behavior, Social behaviors, Path Analysis*

## 1. Introduction

The current study focuses on the teachers' judgment of their elementary school students who were born through interracial marriages and their learning, cultural and social behaviors. Additionally, this study attempts to predict which behavior has the strongest impact on their academic performance.

Migration is not new in human history. The trend of international marriage works as a transition for the purpose of a better life. During the past two decades, many young females were involved in mediated marriages in Taiwan with most of the foreign-born brides from Mainland China and South Asia. They married into Taiwanese families to seek a better social-economic status than in their home countries (Win, 2011). Males in rural Taiwan benefited by having offspring to carry on their family names.

The statistics of the Ministry of Interior Affairs in Taiwan (Ministry of Interior Bureau, 2012) indicated children who were born to immigrant brides now comprise a noticeable portion of the population in Taiwan. Children who were born to these new immigrants are enrolling in elementary schools with a steady rate of growth from 2.17% in 2004 to 11.78% in 2012.

Studies showed that the environment has a direct impact on students' Learning (Keogh, 2003). Greenfield (2009) argued that macro-level changes in context may alter cultural and learning environment as well as children's behaviors. A study by Miles and Stipek (2006) investigated associations between social skills (aggression and prosocial behavior) and literacy achievement among lower-income children. Results revealed that the patterns of associations were different for aggression and prosocial behavior. The authors also found when the strength of the association between aggression and literacy achievement increased over the elementary grades, the association between prosocial behavior and literacy achievement decreased. Using path analyses revealed that poor literacy achievement in the first and third grades predicted relatively high aggressive behavior in higher grades.

Questions addressed within the context of this paper include: How do teachers perceive the New Taiwanese children's academic performance? How do social, learning and culture behaviors predict their academic achievement? Are these behaviors interrelated? And, what strategies do schools, teachers,

community need to offer in order to instill positive learning, cultural, and social behaviors among these New Taiwanese children?

### ***Perspectives***

Government documents and statistical data relevant to the New Taiwanese children and their school performance, immigrants' cultural and self-identity and self-esteem, students' behavior and academic performance are the frameworks for this inquiry.

### ***Cultural Identity and Self-esteem***

Taiwanese society has given new immigrants a new identity after 2005, this group of children was identified as "New Taiwanese" (NT) (Wu & Lin, 2005). Teachers found that in the process of carrying out governmental education policies, the new immigrants faced cultural assimilation and conflicts, especially during the educational and curriculum reform (Chuang, 2007). Chow's (2007) study indicated these new immigrants suffered from low self-esteem and a crisis of self-identity. Consequently, they had little contact and interaction with the neighbors and the community in order to avoid misunderstanding. The lack of representation of their cultures and positive reports further hindered their identity to the local culture. Educators and researchers have paid close attention to the cultures of this group of foreign brides and the children that they have produced, especially when many New Taiwanese children enroll in elementary schools. Wu (2009) found that most children of immigrant mothers did not identify with their mothers' cultures, even though they recognize that their mother is from a different culture. The author's work showed a significant positive correlation with cultural integration in Taiwan. However, Chiang & Griego's (2014) study found these children seldom participate in their mothers' cultural activities

### ***The New Immigrants' Behaviors and School Achievement***

Research revealed that children in different societies or communities may differ in their social experience, social functions and academic achievement (Whiting & Edwards, 1988). New immigrants experienced different levels of stress, as demonstrated in their social behaviors and self-concept. According to Rogers (1959) the self will shape personality. Purkey and Schmidt (1987) noted it is a product of social interaction.

Previous studies of new immigrants' learning demonstrated mixed finding. A study done in Canada revealed that new immigrants performed better on math and had higher intrinsic motivation as compared to non-immigrant students (Areepattamannil & Freeman, 2008). Chan's (2005) study of the New Taiwanese reported that the NT felt they were different from their peers, and they felt inferior to their peers in the areas of academic, social relationships and intelligence. Whereas Lin's (2006) study reported that there is no difference in students' self-concept in Taitung when the foreign brides were from Mainland China.

Studies of NT students' academic performance also have produced mixed findings. Some studies concluded that they were academically behind mainstream students and other studies argued that they did not necessarily perform worse or less than the mainstream. For example, Wang and Wen (2007) found that these children's logic, comprehension and application competencies were better than mainstream students. In 2005, a report from the Ministry of Education indicated 8.2% of the NT students had language development delays. The report went on to state that after the children entered school, their language gaps narrowed significantly during the learning process, while there was no measurable difference from mainstream students by the time they reached the fourth to sixth grades (Chen, 2004).

Peers are important to school-age children. Once children enter schools they spend most of their waking time with their peers. In studies of peer interaction, Lu (2004) reported approximately 20% of NT elementary grade students had social issues, such as being involved in physical fights or being bullied, especially those NT children with language barriers. A report from the Ministry of Education (2006) stated that only 48.44% of participating NT felt they got along well with their peers. In contrast, other studies found that NT students got along well with peers due to their personalities and character traits

(Huang& Tang, 2007) and they had not been excluded or rejected by their peers (Won, 2009). However, Teng’s (2009) study noted that if the NT’s mother is from South Asia, they were normally from lower social economic families and could not benefit their children academically. Teng also stated that this resulted in a negative impact with their peer interaction.

## 2. Methodology

This study used a quantitative method. Survey questions consisted of 24 5-point Likert scale questions eventually grouped into constructs to measure the teachers’ perceived Social Behaviors, Learning Behaviors, and Cultural Behaviors of these students. In addition, 5 open-ended questions were asked to measure teacher perceptions on family and these children’s needed assistance.

Survey questions used Cronbach’s  $\alpha$  as an estimate of the reliability. Data were analyzed using SPSS AMOS 21.0 software to find the path from Social, Cultural, and Learning Behaviors to Reading and Math proficiency. SPSS 21.0 software was used to validate the path using multiple linear regression and reliability analysis. Path analysis assesses Goodness of Fit using a chi square. Path Analysis was utilized to find the path of predictor of students’ Social, Cultural and Learning Behaviors which impacts on students’ Reading and Math performance.

## 3. Findings

One hundred and seven (107) elementary teachers from 16 schools in Taitung, Taiwan participated in this study. Among these 16 schools 8 are in the urban area and 8 are from the rural area. Cronbach’s alpha was used to assess reliability of the three constructs—Cultural, Social, and Learning Behaviors. All met the test of reliability ( $\alpha > .70$ ). Cultural Behaviors had an alpha of .83, Social Behaviors had an alpha of .87, and Learning Behaviors had an alpha of .89.

Path analysis assesses Goodness of Fit using a chi square. Thus, a significant chi square would indicate the model deviated significantly from the path, while a non-significant finding indicates the model was a good path. As seen in Figures 1 and 2, both paths met the Goodness of Fit test (Reading:  $\chi^2 = .435$ ,  $p = .509$ ; Math:  $\chi^2 = .015$ ,  $p = .904$ ). However, Social Behaviors alone was a negative predictor while Learning Behaviors was a positive predictor. Cultural Behaviors was not a direct predictor, but an important covariate with Learning and Social Behaviors. Using multiple linear regression, the model was validated for Reading. The ANOVA was significant [ $F(3, 102) = 8.56$ ,  $p < .001$ ]. The adjusted R squared = .18. The coefficients table showed both Learning Behaviors ( $t = 4.42$ ,  $p < .001$ ) and Social Behaviors ( $t = -2.66$ ,  $p = .001$ ) were positive and negative predictors, respectively, of the dependent variable Reading.

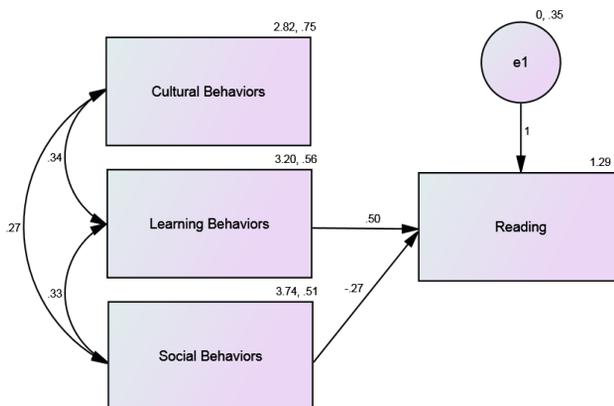
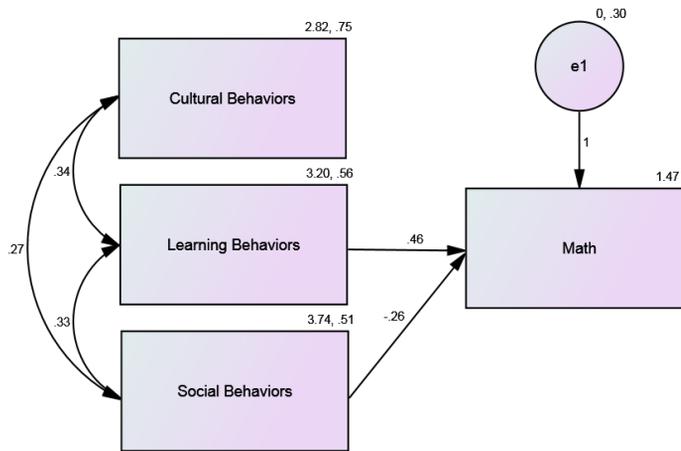


Figure 1. Path Analysis of Reading Ability.

For Math, multiple linear regression also validated the model. The ANOVA was significant [ $F(3, 102) = 8.18, p < .001$ ]. The adjusted R squared = .17. The coefficients table showed both Learning Behaviors ( $t = 4.64, p < .001$ ) and Social Behaviors ( $t = -2.63, p = .01$ ) were positive and negative predictors, respectively, of the dependent variable Math.



**Figure 2. Path Analysis of Math Ability.**

The models suggest that Learning Behaviors is a predictor of both Math and Reading. For Reading, when Learning Behaviors is estimated to go up by 1 standard deviation, Reading is estimated to go up by .50 standard deviations. For Math, when Learning Behaviors is estimated to go up by 1 standard deviation, Math is estimated to go up by .46 standard deviations. Additionally, when Social Behaviors is estimated to go up by 1 standard deviation, Reading is estimated to go down by .27 standard deviation and Math goes down by .26. Cultural Behaviors showed no predictive value to academic performance in Reading or Math in the path analysis.

Cultural, Learning, and Social Behaviors showed interrelated associations as covariates. The covariance findings were as follows:

1. The covariance between Social and Learning Behaviors is estimated to be .33 in Math and Reading.
2. The covariance between Cultural and Social Behaviors is estimated to be in.27 in Mathand Reading.
3. The covariance between Cultural and Learning Behaviors is estimated to be .34 in Math and Reading.

#### 4. Conclusion and Discussion

A summary of the main findings from this study are:

When Learning Behaviors is estimated to increases, Reading and Math is expected to increase. When Social Behaviors is estimated to increases, Reading and Mathis expected to decrease. In each predictive finding, multiple linear regression validated the findings. Additionally, this study found that Social, Cultural and Learning Behaviors are interrelated covariates. However, Cultural Behaviorsshowed no predictive value on reading and math performance.

This study has rich findings for discussion. Social Behaviors negatively impacted on students' Reading and Math performance. Using the indicators of Social Behaviors (e.g., sharing materials, sharing food, get along with peers, etc.) it may have been a distraction to the NT students in Math and Reading performance. Teaching students skills such as time management, concentration, or listening might be

beneficial. The indicators of Learning Behaviors, such as asking answers, doing homework, and volunteering answers, showed positive estimates of improvement in Reading and Math score. Positive Learning Behaviors indicators suggested a positive pedagogical approach and such efforts should be continued and praised in the future. Finally, Cultural Behaviors indicators (e.g., Proud of their parent's culture, Proud of their new immigrant parent, etc.) did not show any predictive influence in the path analysis in their Reading and Math academic performance. Given that some of the lowest means were in the area of Cultural Behaviors, it could be related to their self-esteem or self-worth which were not explored in this study.

### ***Significance and Implications of This Study***

Learning environment and socialization shape personality. A variety of individual differences influence students' behavior and academic performance among this group of the NT. Obtaining firsthand information about these children's learning and social behaviors, and how cultural adaptation work into their academic performances is critical for teachers to teach them effectively.

Findings from this study revealed that social and learning behaviors can be predictors of students' academic performance. Teachers need to cultivate a healthy environment for students' positive social interaction and to encourage their greater learning behaviors.

Further study needs to include more locations and samples. Students' self-esteem might benefit with respect to cultural behaviors. In addition, the relationship between social behavior and reading and math performance needs to be investigated further to explain why it has negative impact on academic performance. These authors did not find any other studies using path analysis to validate Reading and Math performance for a similar sample. Therefore, a replication of this study would be suggested. We believe this study will serve as a pioneer for other researchers as a reference.

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