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Effects of Family and School on Academic Achievement of Korean High School Students

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ABSTRACT

This study examines the influence of family and school on vocational high school students' academic achievement in South Korea. A nationally representative sample from the Korean Education and Employment Panel Survey (KEEP) was analyzed. Results show that variables related to parents did not influence Korean vocational high school students' academic achievement. School facility did not have any influence on the general subject academic achievement, but it impacted the vocational subject academic achievement of Korean students. Two school related variables - teacher ability and relationship were significant for academic achievement.

Keyword: Korean Vocational high school, Academic achievement, Socioeconomic Status (SES), Parental involvement, Teacher ability, Teacher relationship.

Korean society has traditionally put great emphasis on education as a way of achieving social status. The vocational high schools in Korea have been formed to supply skilled labor forces needed for rapid economic development. Education played an important role in Korea's economic and social development, which has been called "the education miracle" (Kuczera, Kis, & Wurzburg, 2009, p.10). Now, the status of vocational high schools is being weakened as students strive for higher education, and general education is becoming more attractive for students (Chae & Chung, 2009).

The Korean education system is based on a

6-3-3-4 system: six years of elementary school education, three years of middle school, and three years of high school, followed by two or four more years of college. Both elementary and middle schools are by legal statute compulsory. At the completion of middle school, all students virtually enter high schools for upper secondary education. Students are selectively placed into different types of high schools based on their academic performance in middle school.

In South Korea, high school education is classified into two types of school: (1) general high schools primarily for academic education leading to colleges and (2) vocational high schools primarily for vocational education

entering the workplace. Vocational high schools offer programs in five fields: agriculture, technology/engineering, commerce/business, maritime/fishery, and home economics. These five programs put more emphasis on practical or job-oriented education and training rather than academic education and training. In principle, all students in vocational high school in Korea have to follow a common national curriculum. About half of the curriculum consists of general subjects (Korean, mathematics, English, etc.) and the other half consists of specialized vocational subjects. Thus, vocational high school students have fewer hours in general subjects, but they are offered courses relevant to their vocational specialization. The curricula of vocational high schools are unfavorable to study in preparing for college admission tests.

The great enthusiasm for education in Korean society, encouraging all children to go on to four-year colleges, has contributed to make vocational high schools less desirable (Kim, 2004). In recent years the number of vocational high schools and students in Korea has decreased. In 2001 there were 778 vocational high schools (39.4% of the total high schools) with 578,865 students (30.3% of the total high school students), whereas in 2010 there were only 692 vocational high schools (30.7 percent of the total high schools) with 463,888 students (23.3% of the total high school students) (Ministry of Education, Science and Technology /Korean Research Institute for Vocational Education and Training, 2011).

Although students of vocational high schools are expected to enter the workforce after graduation, most vocational high school graduates tend to enroll in college education instead of entering the workforce. While the percentage of vocational high school graduates who entered the labor market fell from 76.6 percent in 1990 to 19.2 percent in 2010, the percentage of vocational high school graduates

who enrolled in college increased from 7.8 percent in 1990 to 71.1 percent in 2010 (Ministry of Education, Science and Technology / Korean Research Institute for Vocational Education and Training, 2011). However, it is difficult for vocational high school graduates to gain admittance into a renowned four-year university because of their lack of academic training and the nature of courses offered in vocational high schools, and they pursue two-year junior college degrees.

The degree of academic achievement by vocational high school students is noticeably lower than general high school students. In the national-scale assessment on the degree of academic achievement, most vocational high school students belong to the category of 'below basic level'. According to Korea Institute for Curriculum and Evaluation (KICE), the percentages of students belonging to the category of 'below basic level' are as follows: Mathematics, 93.7% of vocational high school students and 39.2% of general high school students; English, 91.1% of vocational high school students and 36.8% of general high school students; Korean, 72.7% of vocational high school students and 25.8% of general high school students (Park, Jung, & Kim, 2009).

Thus, the general characteristics of vocational high school students were low academic achievement and lack of motivation for learning (Korea Research Institute for Vocational Education and Training, 2000). Today, most Korean parents would not consider vocational education as one of the viable options for their children (Park, Jung, & Kim, 2009). Therefore; it is difficult for vocational high schools to select well-qualified applicants, and to improve the achievement of those selected students. Under these conditions, it is very important to understand the determinants of vocational high school students' academic achievement in order to invent novel methods to improve students' academic achievement.

LITERATURE REVIEW

There are few studies on Korean general high school students' academic achievement (Kwak, 2006; Kim, 2007). Kwak (2006) investigated academic achievement of Korean general high school students by SEM and she found that family latent variable (consisting of parental education, household income, family's interest and educational expectation) had a significantly positive influence on academic achievement. She also found that teacher latent variable (consisting of principal's leadership, teacher relation, and teacher ability) did not significantly influence academic achievement. Kim (2007) explored the effects of family background variable (consisting of parental education, household income), school education variable (consisting of facility and teacher etc.), and private tutoring (consisting of tutoring cost and time) on general high school students' achievement. In the study, family background significantly influenced academic achievement when compared to school education and private tutoring. School education variables did not significantly influence academic achievement. The common features of both studies are that family variables most strongly influenced academic achievement whereas school variables had minimal effect.

There has only been limited research on vocational high school students. Park, Jung, and Kim (2009) found that the basic learning ability of vocational high school students was mostly affected by school factors rather than student or family factors.

Three situations are considered in the current study. First, Korean parents are eager to support their children's education. Adhering to the teachings of Confucianism, Koreans place great value on education. As a result, Korean parental involvement led to better student performances on international achievement test such as TIMSS and PISA

(Park, Byun, & Kim, 2011; Kim, Lavonen, income. & Ogawa, 2009). Second, the students may enter Korean vocational high schools because their middle school grades are not high enough to enroll in a general high school. Third, the vocational high school students' average household income is lower than the average Korean household

Studies have shown some evidences that teacher effects may be more pronounced in low-SES schools than in other schools (Nye, Konstantopoulos, & Hedges, 2004; Konstantopoulos & Chung, 2011). Teachers are not randomly allocated to schools, but instead there is a selection mechanism. In fact, schools with higher proportions of low income or minority students often have difficulty recruiting and retaining effective teachers (Darling-Hammond, 1995). Thus, in lower SES schools, there was larger variability in teacher effectiveness (Nye, Konstantopoulos, & Hedges, 2004; Konstantopoulos & Chung, 2011).

The Korean school system tries to ensure that teachers are randomly allocated to schools. For example, Korean educational authorities require certification for all new teachers, and thus the resulting variance of certified teachers will approach zero (99.8% certified, yielding a variance of 0.0006; Chiu & Khoo, 2005). Teachers in public schools have to rotate among different schools every 4 or 5 years. Teachers in public and private schools are paid similar wages. Even though vocational high school consists of high proportions of low income students, the schools do not have serious difficulty in recruiting and retaining effective teachers. Therefore, teacher effects from the difficulty in recruiting and retaining effective teachers may not have serious impact in Korean vocational high school.

In the following sections, the researchers would like to include literature related to Socioeconomic Status (SES), and Parental Involvement, and school facility,

teacher ability, teacher relationship, and motivation.

Socioeconomic Status (SES): SES describes an individual's or a family's ranking on a hierarchy according to access to or control over some combination of valued commodities such as wealth, power, and social status (Mueller & Parcel, 1981). Park, Byun, and Kim, (2011) shows that Korean parental education and household income influenced Korean middle school students' Mathematics and English test scores.

Parental Involvement: Parents with more financial resources and good education have more economic resources, time, and human capital to invest in their children education (Deplanty, Coulter-Kern, Duchane, 2007; Sheldon, 2002). In Korea, school-based involvement is not prominent among parents. This is due to the fact that the high level of educational standardization in various aspects of educational processes substantially restricts Korean parents' direct influences on educational processes that occur inside schools (Park, Byun, & Kim, 2011). Another type of parental involvement in Korea is considered, private tutoring. A large number of Korean students participate in private tutoring to improve their academic achievement. Korean parents spend an average of \$550 a month to send their children to private tutoring services (Seoul Metropolitan Government 2009; Yim 2010), and spend lots of time to obtain information about private tutors (Park, Byun, & Kim, 2011). Studies showed that school factors such as school facility and teacher ability also influences student academic achievement (Evans, Yoo, & Sipple, 2010; Kane, Taylor, Tyler, & Wooten, 2010).

School Facility: Coleman et al. (1966) argued that generally the physical resources offered in schools are unrelated to the academic achievement of students. Some researchers say

that money is often wasted when administrators spend additional resources improving the physical condition of schools (Hanushek, 1997, 2003; Wei, Clifton, & Roberts, 2012). However, there is a growing body of research suggesting that the physical resources of schools, especially the physical conditions of the buildings, affect the students' attitudes toward education and their academic achievement (Wei, Clifton, & Roberts, 2012). Duran-Naruck (2008) analyzed data on building condition and children's standardized test scores in New York City. In this research, school facilities were predictive of student absenteeism. This absenteeism, in turn, accounted for the student performance. In the study conducted by Evans, Yoo, and Sipple (2010), elementary school children had lower achievement scores if they attended schools of poor structural quality and with high rates of student mobility.

Teacher Ability: Teacher's teaching ability also affect student achievement (Hanushek, 1971; Murnane & Phillips, 1981). The literature on teacher effectiveness has undergone resurgence in recent years. The magnitude of the variation in teacher effects is quite large (Hanushek & Rivkin 2010; Kane, Taylor, Tyler, & Wooten, 2010). The effective teacher has good content knowledge and teaching practice. Teacher's content knowledge is a significant and positive predictor of student success. Clotfelter, Ladd, and Vigdor (2007) examined the relationship between a teacher's mathematical knowledge and a student mathematical achievement. Teachers who create a conducive environment for learning and have classes with good communication, standard-based instruction, thought-provoking questions, and constructive feedback raise student academic achievement (Milanowski, 2004; Kane, Taylor, Tyler, & Wooten, 2010).

Teacher Relationship: A teacher's

relationship with his or her students greatly influences student academic achievement (Roorda, Koomen, & Spilt, Oort, 2011; Woolley, Kol, & Bowen, 2009). Two theories, extended attachment theory and self-system theory explain this influence. According to the extended attachment theory, sensitive teachers can serve as a secure base from which children can explore the school environment and become engaged in learning activities, which are associated with children's achievement (Birch & Ladd, 1997; Roorda, Koomen, Spilt, & Oort, 2011; O'Connor, & McCartney, 2007). According to self-system theory, in order for children to become motivated, three basic psychological needs must be fulfilled: the needs for relatedness, for competence, and for autonomy. Teachers can support these needs by showing involvement (i.e., caring for and expressing interest in the student), providing structure (i.e., setting clear rules and being consequent), and supporting autonomy (i.e., giving students freedom to make their own choices and showing connections between schoolwork and students' interests). If children's basic needs are met, their engagement in learning activities will increase (Skinner & Belmont, 1993). Consequently, they will perform better on achievement tests and receive higher grades (Roorda, Koomen, Skinner, Wellborn, Connell, 1990; Spilt, & Oort, 2011).

Motivation

Motivation serves as a link between social relationships and academic achievement (Parker & Asher, 1987; Wentzel, 1998). Parents and teachers may directly influence students' academic achievement, independent of their relationships to motivational outcomes. For instance, supportive parents and teachers might provide children with instructional opportunities that lead directly to learning and academic achievement. In addition, academic motivation is one pathway through which parents and teachers can

influence children's academic achievement. A sense of social support from parents and teachers leads to the adoption of socially valued goals and objectives (Connell & Wellborn, 1991). If so, this should translate into motivation (Wentzel, 1998). And highly motivated students are more likely to demonstrate achievement-oriented behaviors, and do well academically (Pintrich & Schunk 2002; Ning & Downing, 2010).

RESEARCH METHOD

A nationally representative sample of third year students (12 graders) in vocational high schools from the Korean Education and Employment Panel Survey (KEEP) was analyzed in this study. The KEEP was conducted by the Korean Research Institute for Vocational Education and Training (KRIVET), a national policy research institute of human resources development and vocational education and training. The KEEP is a research survey that extracts representative samples from among the population and traces them for over ten years since 2004. These samples were selected by two-stage stratified sampling design. In addition, parents, classroom teachers, and school administrators were also surveyed. The researchers selected vocational high school student sample in their 4th year (2007) for this study. The size of the sample was 1,393. However, the final sample in this study was reduced to 944 cases excluding the missing variables.

Parental Involvement: Five items were selected to measure parental involvement from the KEEP parent questionnaires. An example of items is "*I always check homework.*" These 5 items were rated on a 5-point Likert-type scale (*1 = Completely disagree, 5 = Completely agree*). A high score sum represented parents who were very involved in their child's education. The Cronbach's alpha in this sample was 0.84.

School Facility: Four items were selected to measure students' perceptions of their school facilities from the KEEP student questionnaires. These 4 items were rated on a 5-point Likert-type scale (*1 = Completely disagree, 5 = Completely agree*). A high sum score represented students who were satisfied with their school facilities. The Cronbach's alpha in this sample was 0.774.

Teacher Ability: Three items were selected to measure students' perceptions of their teacher's ability from the KEEP student questionnaires. Based on two subjects, general (Korean, English, etc.) and vocational subject teachers' abilities were measured.

These 3 items were rated on a 5-point Likert-type scale (*1 = Completely disagree, 5 = Completely agree*). A high score sum represented students who thought their teachers had good teaching abilities. The Cronbach's alphas in these samples were 0.812 for the general subject teacher ability, 0.790 for the vocational subject teacher ability.

Teacher Relationship: To measure students' perceptions of their general teacher relationships, 4 items from the KEEP student questionnaires were selected. The included items can be seen in Table 1. An example of items is "*I have a teacher whom I respect.*" Response options of these questions were Yes (1) or No (0). Because the response options were dichotomous, the sum of all 4 scales was used as an observed measure of teacher relationship in the structural models tested. A high score sum represented students who had good relationships with their teachers. The Cronbach's alpha was 0.725.

Motivation: Four items were selected to measure the degree of students' motivation from the KEEP student questionnaires. In the questionnaires, students are asked to report the reasons why they study. An example of items

is "*I study to become a better person.*" These 4 items were rated on a 5-point Likert-type scale (*1 = Completely disagree, 5 = Completely agree*). A high score sum represented a student who had high motivation. The Cronbach's alpha in this sample was 0.718.

Academic Achievement: Two kinds of academic achievement variables were measured, general subjects (Korean, Mathematics, English, science and, and social studies) and vocational subject. Students reported their degree of proficiency on each subject on a 5-point Likert-type scale. General subjects achievement index were calculated as average grades with sum of the scale of Mathematics, Korean, English, Science and Social studies. The Cronbach's alpha in this sample was 0.613, which is slightly below the acceptable value of 0.7.

DATA ANALYSIS

The data were analyzed with SEM in AMOS SPSS 20, and descriptive statistics were estimated with SPSS 20. Descriptive statistics for all indicators of latent variables in the model are provided in Table 1. The means of scale for school facilities, general subject teacher ability, vocational subject teacher ability, and motivation were slightly over the mid-point 3. The mean for parent involvement was under the mid-point of 3.

The model included five observed variables: monthly household income, parental educational attainment, teacher relationships, general subject achievement, and vocational subject achievement. The mean of scale for monthly household income was 2,647 thousand Korean Won (about \$2,500; *SD* =1,854), which was much under the average monthly income of Korean households nationwide (3,225 thousand Korean Won per household in 2007, Website: Korean Statistical Information Service). As mentioned above,

household income of vocational high school students was lower than average. The mean of scale for parents' educational attainment was 11.35 years ($SD= 2.56$), which was near the year of graduation of high school. The teacher relationships variable was the sum of 4 scales that had dichotomous response options. The mean of scale for teacher relationships was 2.589 ($SD= 1.411$). This means that students generally had good relationships with their teachers. The means for achievement of general subjects were 2.20 – 2.73, which were under the mid-point of 3. The mean for achievement of vocational subjects was 3.07 ($SD=1.075$), which was higher than those of general subjects.

The model was evaluated by three fit indices - the Goodness Fit Index (GFI), Adjusted Goodness Fit Index (AGFI) and Root Mean Square Error of Approximation (RMSEA). GFI and AGFI are ranged from 0.0 to 1.0, and values greater than 0.90 or 0.95 indicate well-fitted (Hooper, Coughlan & Mullen, 2008). RMSEA is also ranged from 0.0 to 1.0, but values less than 0.06 indicate well-fitted. The chi-square statistic is also reported, but because it is sensitive to sample size, other statistics are often used to judge model fit (Hooper, Coughlan & Mullen, 2008).

The model of effects on general subject achievement was evaluated firstly. The fit indices of the model were $X^2(df) = 535.488$ (161), GFI=0.945, AGFI =0.928 and RMSEA = 0.050, suggesting the model had an acceptable fit to the data.

The results of data analysis were presented on Figure 1 and Table 2. The direct effects between variables were presented on Figure 1, and the indirect effects and total effect between variables were presented on Table 2. The standardized coefficients were presented. P-values were calculated with the bootstrap method.

Parental income and educational attainment had significant direct effects on parental involvement ($\beta = 0.176$, $p=0.010$ and β

$= 0.186$, $p=0.010$). But the two variables did not have significant direct effects on academic achievement ($\beta = 0.015$, $p=0.710$ and $\beta = 0.013$, $p=0.636$). Parental involvement did not have significant direct effect on academic achievement ($\beta = 0.032$, $p=0.379$). Thus, the total effect of parental income and educational attainment on academic achievement did not have significant effect ($\beta = 0.022$, $p=0.525$ and $\beta = 0.020$, $p=0.477$). Though parental involvement had indirect effect on academic achievement through motivation ($\beta = 0.067$, $p=0.069$), the effect did not significantly change the total effect.

School facility did not have significant effect on academic achievement ($\beta = 0.076$, $p=0.129$). Teacher ability and teacher relationship had direct effect on academic achievement ($\beta = 0.163$, $p=0.010$ and $\beta = 0.199$, $p=0.010$). The two variables had indirect significant effects on academic achievement through motivation ($\beta = 0.032$, $p=0.010$ and $\beta = 0.013$, $p=0.010$). Thus, teacher ability and relationship had significant total effects ($\beta = 0.195$, $p=0.010$ and $\beta = 0.211$, $p=0.010$).

In summary, family or parent related variables did not influence Korean vocational high school students' general subject academic achievement. At the same time school facility did not influence academic achievement. However, two school related variables - teacher ability and teacher relationship - directly and indirectly influenced academic achievement.

Academic achievement of vocational subjects was included in the study. The figure and table of the analysis result was suggested in Figure 2 and Table 3. The fit indices of this model were $X^2(df) = 555.629$ (161), GFI=.943, AGFI = .925 and RMSEA = .051, suggesting that the current model had an acceptable fit to the data. The results of the data analysis were similar to that of academic achievement of general subjects. However, the difference resulted when considering the influence of the school facility. The school facility did not

influence academic achievement of general subjects, but it influenced academic achievement of vocational subjects ($\beta = 0.147$, $p=0.010$).

In summary, family or parent related variables did not influence Korean vocational high school students' academic achievement. School facility did not influence on the general subject academic achievement, but

influenced the vocational subject academic achievement. Two school related variables - teacher ability and relationship -directly and indirectly influenced academic achievement.

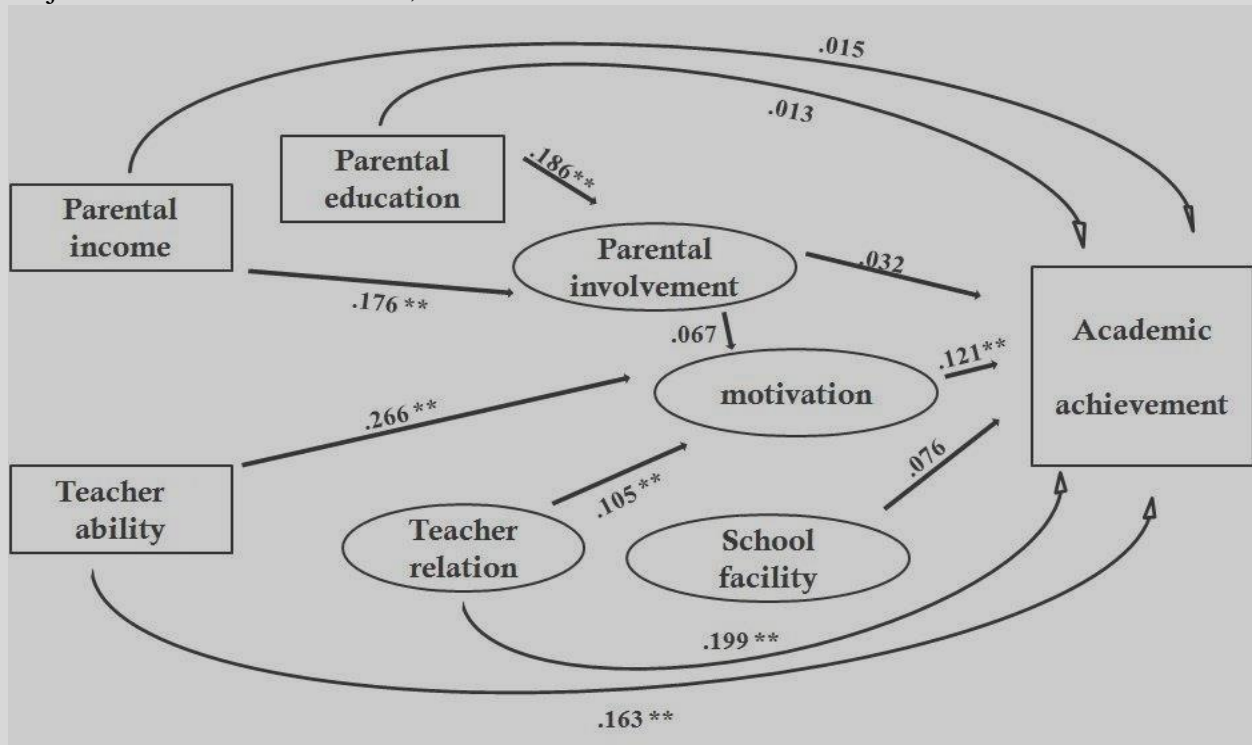


Figure 1: The model of research and the results of the analysis of effects on general subject achievement

DISCUSSION

In this research, family or parent related variables did not influence Korean vocational high school students' academic achievement.

Previous research (Kim, 2007; Kwak, 2006) on Korean general high school students found that family variables have big influences on academic achievement. The conditions of 'education of Korean vocational school students are very complex when compared to general high school students. The former have

low basic academy ability. Thus, it is hard for parents to support further development of their high school children's academic abilities.

Students have to decide whether to go on to college or to get a job. To help with this decision, parents should be informed about this process as well. However, it is difficult for parents to obtain the needed information and support their children in their studies.

School facility did not influence general subject academic achievement, but it did influence vocational subject academic

achievement. Generally speaking, both general subjects and vocational subjects are needed to complete vocational education. In the knowledge/imagination age, vocational education should take an approach to academic and career-focused education that will lead to both employment and post-secondary education (Pucel, 2001). To complete vocational education, both general subjects and vocational subjects are needed. Korean vocational high school students have two possible paths after graduation – enter college or get a job. Korean society needs many workers who graduated from vocational high school.

Nowadays, a considerable number of vocational high school students, with support from their parents, want to enter college. These vocational high school students have interest in only general subjects to prepare for college admission tests. According to the results of this study, school facilities do not significantly influence general subject academic achievement. To educate students to pursue college after graduation, investments in school facilities are not needed so much. The considerable rate of investment for vocational subjects may be a waste of money. In this situation, educational authorities should reduce the number of vocational high school students.

Two school related variable - teacher ability and relationship -directly and indirectly influenced academic achievement. These results were different from those of previous researches on Korean general high school students' academic achievement (Kwak, 2006; Kim, 2007). It can be concluded that because the vocational high school students have minimal learning ability, all teachers cannot succeed in teaching these students. Thus, in Korean vocational high schools, teacher ability and relationship affect students' academic achievement. In this situation, teachers in a vocational high school should understand students' basic learning abilities and work out to teach these students appropriately.

Teachers can also advise to go to college or get a job after graduation because teachers are in an ideal position to obtain information about colleges and jobs. School and teachers should make communication channels with students' parents to give and obtain information about career guidance and students' study, which maximize the effectiveness of parental involvement. Although the results of this study contribute to the knowledge about the influences of family and school variables on academic achievement of Korean vocational high school students, this study must be viewed cautiously because of the limitations.

The KEEP data which were used in this study do not offer individual general subject teacher ability and relationship, but comprehensive general subject teacher ability and relationship. To study the influence of comprehensive general subject teacher ability and relationship on comprehensive general subject academic achievement, comprehensive general subject academic achievement index was needed. Subject achievement index was calculated as average grades with sum of the scale of Mathematics, Korean, English, Science and Social studies. In the future research on vocational high school student academic achievement, data including individual general subject teacher ability and relationship, and academic achievement should be collected and analyzed.

CONCLUSION

The purpose of the study was to examine the determinants of Korean vocational high school students' academic achievement especially when the achievement is related to students' family and school. The vocational high school students' average household income is low, and a large number of vocational high school students do not have a high level of learning ability. The findings of this study lead to the conclusion that two school related variables - teacher ability and relationship - directly and

indirectly influenced Korean vocational high school students' academic achievement. But family or parent related variables did not influence students' academic achievement. Parents' financial resources and abilities do not affect students' academic achievement. But teachers contact directly with students in school affects students' success.

In this study, the results indicate that a teacher has the primary influence on a students' academic achievement in Korean vocational high school. Korean educational authorities need to make plans to improve

teachers' knowledge of their subjects and teaching skills as well as to provide good educational environment. At the same time *pre-service teachers should be trained to understand the subject knowledge and teaching skills. Also, teachers should understand students' human dimension and form continuous relations with students. Teachers will have to spend time to improve their subject knowledge and teaching skills and should not waste time on miscellaneous works besides teaching and building good relationship with students.*

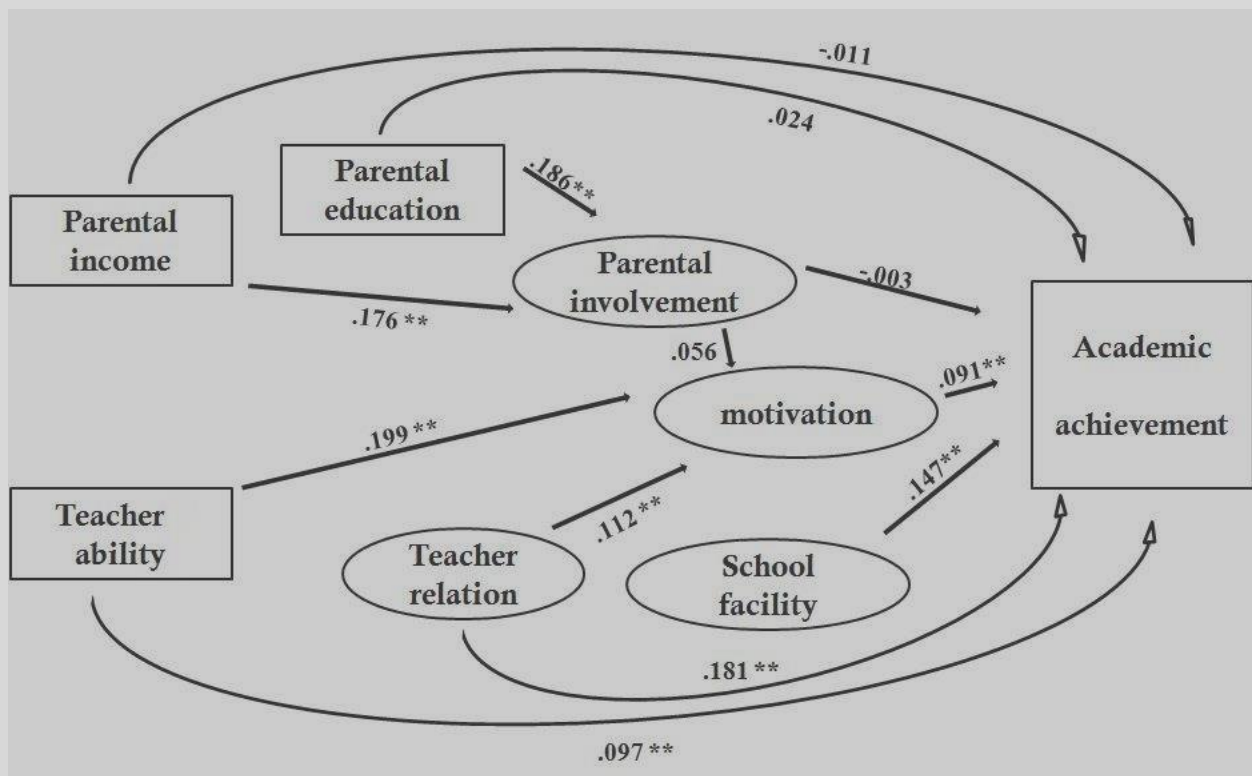


Figure 2: The results of the analysis of effect on vocational subject achievement (*: $p \leq 0.05$, **: $p \leq 0.01$)

Table 1:
Descriptive statistics of variables of this study

	Range	Mean	Standard Deviation	Standardized regression weight
Parent involvement				
Checking homework	1-5	2.15	.799	.626
Communicating with child's friend or their parents	1-5	2.29	.912	.735
Surfing the Internet in order to obtain information	1-5	2.14	.951	.716
Making child take private tutoring	1-5	2.17	.914	.553
Knowing regarding other parents' activities	1-5	2.67	.980	.643
School facility				
School buildings and classrooms	1-5	3.03	.898	.687
Playground and athletic facilities	1-5	3.05	.999	.696
Computers and audio-visual facilities	1-5	3.42	.960	.682
Library	1-5	3.33	1.018	.532
General subject teacher ability				
Excellent teaching skills	1-5	3.19	.856	.711
Liking teaching	1-5	3.33	.800	.851
Knowledge about the subject	1-5	3.56	.850	.752
Vocational subject teacher ability *				
Excellent teaching skills	1-5	3.25	.849	.707
Liking teaching	1-5	3.35	.829	.793
Knowledge about the subject	1-5	3.57	.882	.741
Motivation				
To become a better person	1-5	3.72	.832	.613
To earn money	1-5	4.10	.824	.715
To get a good job	1-5	4.06	.784	.581
To do what I want in the future	1-5	4.06	.857	.918
Teacher relationship				
I have a teacher whom I respect.	0-1	.67	.470	
I have a teacher who is interested in my aptitude and my career.	0-1	.62	.486	
I have a teacher whom I like.	0-1	.69	.461	
I have a teacher who understands me.	0-1	.61	.489	
Academic achievement				
Korean	1-5	2.73	.899	
Mathematics	1-5	2.20	1.031	
English	1-5	2.28	.992	
Science	1-5	2.28	.953	
Social studies	1-5	2.50	1.028	
Vocational subject	1-5	3.07	1.075	

Note. * This variables' standardized regression weights are calculated in Model of vocational subject achievement. Other variables' standardized regression weights are calculated in Model of general subject achievement.

Table 2
Standardized Total, Direct, and Indirect Effects in the Model of General Subjects

Path	Total effect	Direct effect	Indirect effect
Parental income → Academic achievement	0.022	0.015	0.007
Parental educational attainment→ Academic achievement	0.020	0.013	0.008
Parental involvement→ Academic achievement	0.040	0.032	0.008
Teacher ability→ Academic achievement	0.195**	0.163**	0.032**
Teacher relationship→ Academic achievement	0.211**	0.199**	0.013**
School facility → Academic achievement	0.076	0.076	
Motivation → Academic achievement	0.121**	0.121**	

Note. *: $p \leq 0.05$, **: $p \leq 0.01$

Table 3
Standardized Total, Direct, and Indirect Effects in the Model of Vocational Subject

Path	Total Effect	Direct Effect	Indirect Effect
Parent Income -----Academic Achievement	-0.010	-0.011	0.000
Parental Educational Attainment---- Academic Achievement	0.024	0.024	0.000
Parental Involvement ----- Academic Achievement	0.002	-0.003	0.005
Teacher Ability----- Academic Achievement	0.115*	0.097*	0.018*
Teacher Relations ----- Academic Achievement	0.191**	0.181**	0.010**
School Facility----- Academic Achievement	0.147**	0.147**	
Motivation ---- Academic Achievement	0.091**	0.091**	

Note. *: $p \leq 0.05$, **: $p \leq 0.01$

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