Research Article

Gifted students' achievement in Natural Sciences: a modeling study

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Article Info

Abstract

The purpose of this study is to empirically analyze the effect of father involvement, mother involvement, teacher-student interaction, and peer support on achievement in natural science of gifted students with self-regulated learning as a mediator. The subjects of this study were 45 gifted students with a minimum IQ of 130 (WISC-IV) who studied at the junior high school level. Data were collected from the father involvement scale, mother involvement scale, peer support scale, teacher-student interaction scale, and achievement test in natural science of gifted students developed by the researcher. The analysis was then conducted using Structural Equation Model with Partial Least Square (PLS). The results of the path analysis show that: Teacher-student interactions and peer support have affects the achievement in natural science of gifted students, while the father's and mother's involvement do not affect the achievements in natural science of gifted students. Teacher-student interactions and mother's involvement have effects on self-regulated learning, while father's involvement and peer support have no effects on self-regulated learning. The achievement in natural science of gifted students is not influenced by self-regulated learning. Thus, self-regulated learning is not a mediator variable between social environmental factors and achievement in natural science of gifted students.

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Introduction

The academic achievement of gifted students is an interesting study in the world of education. The academic achievement of gifted students is the basis for developing the contribution of gifted students in community life. Gifted students as individuals with extraordinary potential, bring great expectations for high achievement and success

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(Marisano & Shore, 2010). The community hopes that the higher the potential of gifted students the more they can contribute to various fields of life.

Empirical facts show that the potential of extraordinary from gifted students is not automatically actual in academic achievement at school. The emergence of the phenomenon of gifted underachiever students, namely gifted students with low academic achievement, shows that their intelligence potential is not functioning optimally. Robinson (2002) views that gifted students who have low achievement are a disaster in modern society. Reis and McCoach (2002) said that if there is no effort to help gifted students who have low achievements, society will lose valuable potential for the progress of a nation.

Achievement in Natural Sciences of the Gifted Students

The extraordinary intellectual potential of gifted students will actually become the achievement in natural science, requiring the contribution of non-cognitive and environmental factors. Heller (2004) explained in the Munich Model of Giftedness that the intellectual potential of gifted students can be an achievement in natural science influenced by non-cognitive personal characteristic factors. The non-cognitive factors play an important role in actualizing the extraordinary intellectual potential of gifted students in the achievement in natural science
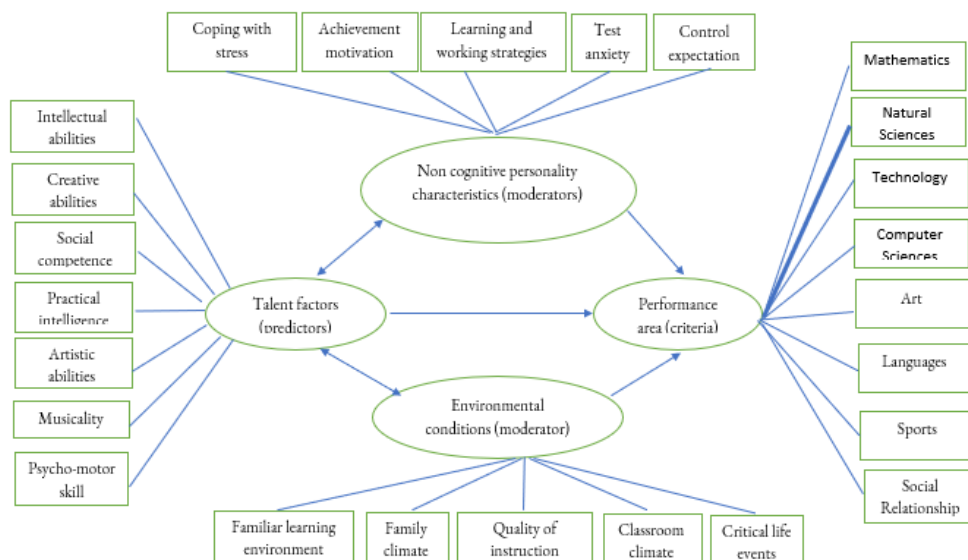

Figure 1

The Munich Model of Giftedness. Adapted from "Identification of Gifted and Talented Students" by (Heller, 2004)

Heller (2004) explained that non-cognitive factors are personal characteristics, such as: achievement motivation and learning and working strategies. These two non-cognitive factors are integrated in self-regulated learning activities. Tanemmbaum (1983) explains that one of the non-intellectual factors that influence the achievement of gifted students is meta-learning and dedication to the chosen field. Meta-learning and dedication are manifestations of self-regulated learning. Heller (2004) and Tanemmbaum (1983) mention the contribution of social environmental factors, but there is no explanation of how the relationship between social environmental factors and self-regulated learning is. This opens up space for research so that theoretical needs for models that explain the relationship between the social environment, self-regulated learning, and achievement in natural science for gifted students are explained.

Self-regulated Learning

Baslanti and McCoach (2006) and Alsa (2005) explained that self-regulated learning is the best predictor of distinguishing gifted students with high and low academic achievements. Gifted students with high achievement have good self-regulated learning abilities, while gifted students with low achievements have poor self-regulated learning abilities.

Zimmerman (1989) explains that the difference in the level of self-regulated learning between students can be explained in the perspective of social cognitive theory. Self-regulated learning is influenced by personal, behavioral, and environmental aspects. Bandura (1986) explained that the interaction of personal, behavioral, and environmental aspects does not mean something symmetrical. At certain times the environment has a stronger influence than personality and behavior. The environment consists of the social and physical environment.

Social Environment

Research by Reis & Greene (2014) illustrated that social conditions can affect how gifted students develop self-regulated learning. Social conditions are related to support and encouragement from teachers, parents, and friends in teaching, modeling, and strengthening self-regulated learning strategies for gifted students. The solution to develop self-regulated learning for gifted students is to provide support and encouragement to implement self-regulated learning strategies by teaching, modeling, and appreciating the choice of self-regulated learning strategies for gifted students by parents at home, teachers, and friends at school. Reis & Greene explained that developing self-regulated learning in gifted students requires support and encouragement from the social environment.

Zimmerman (1989) explained that the influence of the social environment is the most influential factor in developing self-regulated learning, especially for developing students' self-efficacy. The social environment serves to establish standards of self-evaluation and provide reinforcement on behavior (Bandura, 1986). So far, there has not been much research on the effect of the social environment of gifted students on self-regulated learning of gifted students and achievement in natural science of gifted students with comprehensively

Efforts to increase achievement in natural science are also carried out by increasing students' self-regulated learning. Various studies have shown that self-regulated learning improves student learning outcomes in natural science (Olakanmia & Gumboa, 2017). Likewise, increasing the achievement of gifted students in natural science can be done by increasing self-regulated learning abilities (Yoon, 2009; Moote, Williams, & Sproule, 2013).

Based on the literature review and previous research, it was concluded that non-cognitive factors contributed significantly to the academic achievement of gifted students. Self-regulated learning as a non-cognitive factor is the main predictor in the academic achievement of gifted students. Self-regulated learning is formed from the interaction of cognitive processes and social processes. Gifted students need social support to optimize cognitive processes in self-regulated learning.

Self-regulated learning is developed with support from the social environment. Teachers, parents, and friends are the main social environment for gifted students. The existence of a social environment can be a facility for gifted students to increase the use of self-regulated learning and will further increase the achievement of gifted students in natural sciences.

Problem of Study

The theoretical problem that arises at this time is that there is no strong concept of the influence of the social environment on the self-regulated learning of gifted students and achievement in natural science. Previous research partially tested the influence of the social environment on self-regulated learning and achievement in natural science for gifted students. This still leaves a problem when faced with the complexities of academic achievement of gifted students in natural science. Does the social environment have a direct effect on the achievement in natural science of gifted students, or the influence of the social environment on the achievement in natural science of gifted students is mediated by self-regulated learning? Based on this question, the purpose of this research are to empirically analyze the effect of father involvement, mother involvement, teacher-student interaction, and peer support on achievement in natural science of gifted students with self-regulated learning as a mediator.

Method

Research Design

This quantitative research uses the correlational method. Correlation coefficient can be used to test hypotheses about the correlation between variables or to state the size of the correlation between variables. In this study there are three variables, namely the predictor variable, the mediator variable, and the criterion variable. This is in line with the research objectives set by the researcher, namely empirically testing the effect of father involvement, mother involvement, teacher and student interaction, and peer support on achievement in natural science of gifted students with self-regulated learning as a mediator.

Research Variable

This study uses five variables: father involvement, mother involvement, teacher-student interaction, peer support, self-regulated learning, and achievement in natural science of gifted students. Achievement in natural science of gifted students is the criterion variable. Father involvement, mother involvement, teacher-student interaction, and peer support are predictor variables. The mediator variable is self-regulated learning. The model of relationship between the variables can be seen in Figure 2.
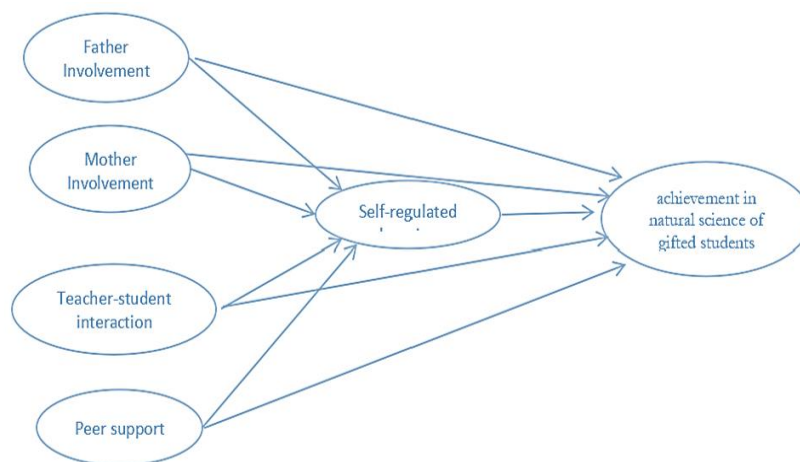

Figure 2

Determinant Model of Achievement in Natural Science of Gifted Students: Self-Regulated Learning as Mediator

Instruments

There are five psychological scales used in data collection: father involvement scale, mother involvement scale, teacher-student interaction scale, peer support scale, and self-regulated learning scale. Data on achievement in natural science of gifted students uses an achievement test in the form of a written test. The number of questions in the test is six and students choose three questions to solve.

Father Involvement Scale

The father involvement scale has two dimensions: home-based involvement and academic socialization involvement. The items on the father's involvement scale are 21 items with a loading factor between 0.6 - 0.852. The reliability score for the home-based involvement dimension is 0.872 and the social-academic involvement dimension is 0.865.

Mother Involvement Scale

The mother involvement scale has two dimensions: home-based involvement and academic socialization involvement. The items on the father's involvement scale are 21 items with a loading factor between 0.6 - 0.899. The reliability score for the home-based involvement dimension is 0.808 and the social-academic involvement dimension is 0.869.

Teacher-student Interaction Scale

The teacher-student interaction scale has three dimensions: emotional support, class organization, and instructional supports. The teacher-student interaction scale items totaled 27 items with a loading factor between 0.6 - 0.904. The reliability score of the emotional support dimension is 0.924, the classroom management dimension is 0.844, and the learning support dimension is 0.897.

Peer Support Scale

The peer support scale has four aspects: informational support, instrumental support, friendship support, and esteem support. The friend support scale item is 12 items with a loading factor between 0.6-0.972 and a reliability score of 0.845.

Self-Regulated Learning Scale

The self-regulated learning scale has three dimensions: metacognition, motivation, and behavior. The self-regulated learning scale items consist of 30 items with a loading factor between 0.600-0.934. The core reliability of the metacognition dimension is 0.909, the motivation dimension is 0.719, and the behavioral dimension is 0.795.

Achievement Test in Natural Sciences

The quality of the achievement test was evaluated from content validity, reliability, item difficulty index, and item discriminatory power index. The content validity test for the achievement test was carried out by teachers who teach science subjects at State Junior High School 1 Surabaya. Reliability testing is based on the alpha coefficient (α) of 0.432. This achievement test has an item difficulty index of 0.556 for the first item, 0.267 for the second item, and 0.333 for the third item. In addition, this achievement test has an item discrimination index for the first question of 0.864, the second item of 0.545, and the third item of 0.682.

Population and Sample

The population of this study were junior high school students with acceleration program at East Java, Indonesia. The total population is 357 students. The sample selected is students with a minimum IQ of 130 based on the Wechsler scale. Students identified with a minimum IQ of 130 based on the Wechsler scale (WISC-IV) were 45 students (12.605% of 357 students).

Table 1

Characteristics of Research Sample

Variables		Number	Percentage
Age	*12-year-old*	4 students	9 %
	13-year-old	22 students	49 %
	14-year-old	19 students	42 %
Sex	*Male*	26 students	58 %
	Female	19 students	42 %
Father's Education	*High School*	2 students	4 %
	Diploma	2 students	4 %
	Undergraduate (S1)	25 students	56 %
	Graduate (S2)	10 students	22 %
	Post Graduate (S3)	6 students	14 %
Mother's Education	*High School*	2 students	4 %
	Diploma	2 students	7 %
	Undergraduate (S1)	35 students	78 %
	Graduate (S2)	4 students	9 %
	Post Graduate (S3)	1 students	2 %
Working Mother		25 students	56 %
Program	*Gifted*	26 students	58 %
	Regular	19 students	42 %
Loving Natural Sciences		28 students	62 %
Total		45 students	100 %

Data Analysis

Data analysis was conducted to test the hypothesis. The hypothesis in this study is that achievement in natural science of gifted students is influenced by father involvements, mother involvements, teacher-student interaction, and peer support with self-regulated learning as a mediator. Testing the research hypothesis using the Structural Equation Model (SEM) using Partial Least Square (PLS). The purpose of using PLS is to predict the correlation between constructs. The PLS SEM test was carried out by looking at the correlation between the constructs, the significance value, the Stone-Geisser Q-Square Test for predictive relevance and the Normed Fit Index (NFI) of the research model.

Results

There are several things that are conveyed in the study of research results, such as the relationship between variables, analysis of direct and indirect paths, and analysis Structural Equation Model (SEM). Relationship between the variables shown on the Table 2.

Table 2
Relationship between the Variables

	Father's Involvement	Mother's Involvement	Teacher and Student Interaction	Friends' Support	Self-Regulated Learning	Academic Achievement
Father's Involvement	1.000					
Mother's Involvement	0.703**	1.000				
Students and Teachers Interaction	0.300*	0.057	1.000			
Peer Group Support	0.350*	0.320*	0.431*	1.000		
Self-Regulated Learning	0.427*	0.471*	0.544*	0.576*	1.000	
Achievement in natural science	0.238	0.242	0.594*	0.586*	0.520*	1.000

Note::* $p < 0,05$, ** $p < 0,01$

Table 3
Coefficient of Direct Path

Variables	Original Sample (O)	Sample Mean (M)	Standard Deviation (STDEV)	T Statistic	P Value
Self-regulated learning → Achievement in natural science	0.062	0.093	0.252	0.246	0.806
Father involvement → Self-regulated learning	-0.107	-0.045	0.255	0.422	0.673
Father involvement → Achievement in natural science	-0.197	-0.228	0.262	0.753	0.452
Mother involvement → Self-regulated learning	0.399	0.355	0.184	2.165	0.031
Mother involvement → Achievement in natural science	0.219	0.257	0.262	0.838	0.402
Teachers-student interaction → Self-regulated learning	0.377	0.386	0.101	3.715	0.000
Teachers-student interaction → Achievement in natural science	0.467	0.398	0.217	2.151	0.032
Peer support → Self-regulated learning	0.216	0.199	0.147	1.472	0.142
Peer support → Achievement in natural science	0.375	0.384	0.147	2.011	0.045

Based on the path analysis, it is known that there are only four significant paths, namely:

➢ Teacher-students interaction on self-regulated learning (T = 3.175; p < 0.01)

- Teacher-students interaction on the achievement in natural science of gifted students (T = 2.151; p < 0.05)
- Mother involvement on self-regulated learning (T = 2.165; p < 0.05)
- Peer support on achievement in natural science of gifted students (T = 2.011; p < 0.045)

Table 4

Coefficient of Indirect Path

Variables	Original Sample (O)	Sample Mean (M)	Standard Deviation (STDEV)	T Statistics	P Value
Father involvement $\rightarrow$ Achievement in natural science	-0.007	0.005	0.073	0.091	0.927
Mother involvement $\rightarrow$ Achievement in natural science	0.025	0.034	0.106	0.233	0.815
Teacher-student interaction $\rightarrow$ Achievement in natural science	0.023	0.040	0.104	0.225	0.822
Peer support $\rightarrow$ Achievement in natural science	0.013	0.011	0.064	0.212	0.832

Analysis of Indirect path on table 16 can be explained as follows:

- The effect of father involvement on achievement in natural science through self-regulated learning (T = 0.091; p > 0.05). Conclusion: self-regulated learning does not function as a mediator
- The effect of mother involvement on achievement in natural science through self-regulated learning (T = 0.233; p > 0.05). Conclusion: self-regulated learning does not function as a mediator.
- The effect of teacher-student interactions on achievement in natural science through self-regulated learning (T = 0.225; p > 0.05). Conclusion: self-regulated learning does not function as a mediator.
- The effect of peer support on achievement in natural science through self-regulated learning (T = 0.212; p > 0.05). Conclusion: self-regulated learning does not function as a mediator.

Analysis of Structural Equation Model

Analysis of Structural Equation Model (SEM) using Partial Least Square (PLS) was carried out by looking at the correlation between the constructs, the significance value, the Stone-Geisser Q-Square Test for predictive relevance and the Normed Fit Index (NFI) of the research model. The Q-Square value is 0.78462. Q-Square value greater than 0 indicates that this model has predictive relevance.

Based on the calculation of the Normed Fit Index (NFI) value from the determinant model of achievement in natural science of gifted students with self-regulated learning as mediator are 0.617. If the NFI value is closer to 1, then the model is getting better (fit) and can be used to test the hypothesis. Based on the analysis of the structural equation model, it is known that the achievement in natural science of gifted students with self-regulated learning as mediator is a fairly good model and has predictive relevance, but is unable to explain the contribution of mediating variables.
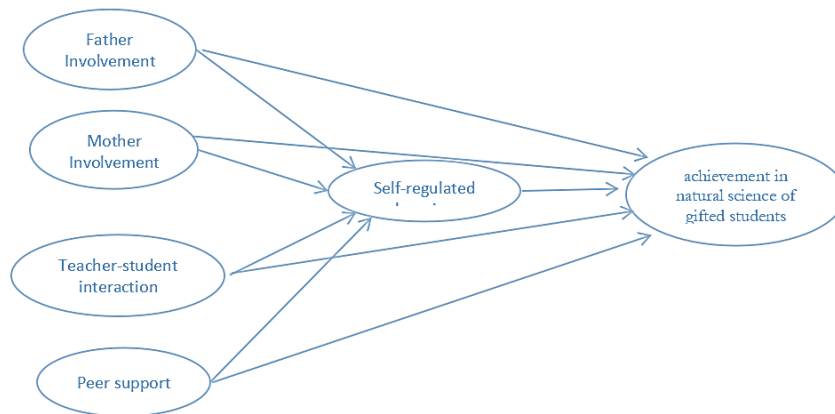
Figure 3

Determinant Model of Achievement in Natural Science of Gifted Students

Table 5

R-Square of Predictor and Mediator Variable

Variables	R-Square	P-Value
Father involvement, mother involvement, teacher-student interaction, and peer support self-regulated learning	0.555	0.000
Father involvement, mother involvement, teacher-students interaction, peer support, self-regulated learning $\longrightarrow$ achievement in natural science of gifted students	0.516	0.000

The contribution of the predictor variable to the mediator variable is 55.5%. The contribution of the predictor variable and the mediator variable to the criterion variable is 51.6%. The rest is the contribution of other variables.

Discussion

Achievement in natural sciences of gifted students is influenced by the teachers-students interaction and the peer support. This shows that social environmental factors that play a major role in influencing achievement in natural sciences of gifted students are teachers and friends. The results of this study strengthen the concept presented by Heller (2004) in The Munich Model of Giftedness that environmental conditions are a factor that plays an important role in actualizing cognitive potential into academic achievement for gifted students, especially achievement in natural science. Without the support of environmental conditions, the potential for gifted students does not function optimally.

Environmental conditions include the classroom atmosphere and learning environment. The interaction of teachers and students in learning at school and classmates is part of what affects the classroom atmosphere. Teachers and friends are the learning environment in schools. Gifted students spend eight hours a day with teachers and classmates while studying at school. Teachers and students spend a lot of time interacting academically. This interaction provides an opportunity for teachers to show concern, fairness, and respect for students. The ability of teachers to create a conducive atmosphere in interacting with students plays a significant role in fostering a positive learning environment and promoting student achievement (Pianta, 2008).

The teachers-students interaction is positively correlated with academic achievement. The higher the quality of teacher-student interaction, the higher the academic performance. The quality of teacher-student interaction is one of the most important factors, which affects the emotional health and learning of students while at school. When students have a positive interaction with the teacher, they have a positive attitude to learning, and finally the student's academic performance improves (Omrod, 2008).

The teacher's ability to create a conducive atmosphere in interacting with students plays a significant role in fertilizing a positive learning environment and promoting student achievement. In teacher-student interaction, teachers improve academic achievement through the provision of emotional support, class organizing, and learning support (Pianta, 2008).

Especially for emotional support, it is very much needed for gifted students in learning natural science. Problems in learning in gifted students occur due to high curiosity (Van Tiel & Widyorini, 2014). This causes gifted students to ask different questions in different points of view. When the teacher provides emotional support, a conducive learning atmosphere will be created. Students do not feel afraid to explore their various curiosities as a provision to explore the science subjects they study.

Similar research results were also conveyed by Jin & Moon (2006) that special classes with challenging curricula and professional teachers caused gifted students to feel more valued. Based on the existing curriculum, the teacher arranges the objectives and methods used so that teacher-student interactions occur in a conducive learning atmosphere. This will improve the achievement in natural science of gifted students.

The peer support affects the achievement in natural science of gifted students. Gifted students enter adolescence while studying in Junior High School. The subjects in this study were 12-14 years old. The emotional center in adolescence shifts from the family to individuals outside the family, namely peers (Tanner, 2006). Peers play an important role for adolescents to meet their emotional needs. Adolescents have a strong need to be liked and accepted by their peers or groups. As a result, they will feel happy if they are accepted and on the contrary they will feel very depressed and anxious if excluded and belittled by their peers. For adolescents, the views of their friends towards themselves are the most important thing so that adolescents will try to follow the opinions of their peers to be accepted as part of the group.

The impact of peer support affects the learning motivation of gifted students. Gifted students often experience a decline in academic achievement during adolescence (Hill, 2005, when entering the education level in Junior High School. The need to be accepted by peers is greater than the motivation to achieve academic achievement. Therefore, gifted students need the support of friends to maintain their learning motivation so that they achieve academic achievement in science subjects.

Various studies have shown that peer support has an effect on academic achievement (Gallardo, et. al. 2016). Selection of friends predicts learning achievement, behavioral problems, and levels of teacher involvement in schools (Benson et. al., 2006; Rubin et. al., 2006). When students choose friends who are academically oriented, their academic achievement will be better. On the other hand, if students choose annoying friends, their academic achievement will decrease and their behavioral problems will increase. If gifted students have friends who are oriented towards achievement in natural science, gifted students will have better achievements of natural science.

Baker (2016) found that the peers of gifted students who were around him had a significant influence on their learning activities. Gifted students who interact with peers, who have low learning motivation, will cause them to be less enthusiastic in learning. The desire of gifted students to be accepted by their peers causes them to reduce their learning motivation. This has an impact on the decline in achievement in natural science of intelligent students.

Based on previous research, it was explained that peer pressure in regular classes hindered the academic motivation of gifted students because gifted students often got reproach if they conveyed their special talents (Delisle, 1984), scientific opinions, and as bookworms (Silverman, 1993). Peer pressure in regular classes was also investigated by Reis and McCoach (2000) and Rimm (2002) where they found that peers had a very significant effect on the low achievement of gifted students. About 66% of the gifted students said that their peers opposed them to rank highly in school. Often, gifted students face a conflict between accepting peer pressure and the need for academic achievement. This is what causes gifted students who excel in choosing to leave the group (Mawson, 2002). Conflicts of need to get recognition from peers often arise at the age of 13 years, when gifted students enter adolescence. Especially in gifted students who have an IQ of more than 160, they have problems with social acceptance.

However, the results of this study indicate that gifted students also receive the support of friends from the regular class. This shows the social competence of gifted students in a good category. With good social competence, gifted students are able to build relationships and maintain social relations with the social environment, including with peers in regular classes. Good social competence in gifted students is influenced by positive self-concepts in gifted students (Aslan & Yukay-Yuksel, 2018). So gifted students are accepted and get support from friends because gifted students have a positive self-concept. Gifted students have a positive view of themselves, both on their strengths and weaknesses so that they can interact with peers with different levels of intelligence and identity.

The self-concept of gifted students is the result of interaction with their social environment (Cross, et al. 2015). The development of self-concept starts at home when gifted students interact with their parents, after entering school age, gifted students interact with teachers and peers at school. It seems that gifted students get good care from parents and teachers at school and have peers who appreciate and support their potential so that positive self-concepts become the personalities of gifted students.

Achievement in natural science of gifted students is not influenced by the involvement of fathers and mothers. The explanation why the achievement in natural science of gifted students is not influenced by the involvement of fathers and mothers can be viewed from the factors of fathers and mothers, gifted students, and the characteristics of science subjects. Father and mother factors, including time, type of parenting, and parents' belief in their abilities. The factors of gifted students include internal motivation and psychological conditions during adolescence. Meanwhile, the characteristic factor of natural science is science as an integrated science that requires broad insight.

The time that fathers and mothers have is often a reason to be more involved in children's learning. Fathers spend more of their time working so that all matters relating to children's learning activities are left to the mother. Fathers who spend more time working causes their involvement with children to decrease (Doherty & Beaton, 2004). Fathers will be more involved in children's learning activities when fathers have more flexible time.

The time for children finally becomes even more narrow when the mother is also working. All the fathers of the gifted students in this study were employed and more than half of the mothers of the gifted students were also employed. A working mother spends what she has for work. Mothers have more free time to be involved in children's learning activities during holidays. The limited time of father and mother causes parents of gifted students to be less involved in children's learning activities. Likewise, the time that children have. Gifted students spend part of their time studying at school. Study time in Junior High School is approximately eight hours a day. Gifted students go to school in the morning and return home in the afternoon. They met with father and mother in the afternoon because father and mother had also just returned from work in the afternoon. This results in fathers and mothers spending only a few hours with their children before bedtime at night.

Apart from time constraints, in general, parental involvement in children's learning decreases as children grow older (Seyfried and Chung, 2002). The involvement of parents when studying in elementary school is higher than when children study in junior high school. Likewise, the involvement of fathers and mothers in gifted students decreases when entering the Junior High School level because gifted students are more independent in learning, especially when studying at home (Deur, 2011). In addition, gifted students during adolescence increasingly understand the advantages and disadvantages in the academic field (Jeynes, 2007) so that they rarely involve parents in learning activities compared to when they were in elementary school.

Parents of gifted students as Generation Y provide exploration space for gifted students when studying at home so that gifted students feel free from various rules, unlike when studying at school. Parents as the authority at home provide a wider exploration space in learning. Learning for gifted students is an activity that is driven by internal motivation and self-needs of gifted students (Renzulli & Reis, 1997). So parenting styles that provide exploration space for gifted students will increase the independence of gifted students in learning so that parents do not affect the achievement in natural science of gifted students.

The internal motivation factor for achieving achievement from gifted students also causes father and mother involvement to have less effect on academic achievement of gifted students. As it is known that gifted students have high internal motivation to learn (Gottfried and Gottfried, 1996). This contributed significantly to his academic achievement. Internal motivation to learn is the main factor in achieving success in academic achievement (Seyfried and Chung, 2002) including in achieving achievement in natural science of gifted students. This means that the involvement of fathers and mothers in learning is not the main factor for gifted students in achieving achievement in natural science. Even without the involvement of father and mother, gifted students can achieve achievements in natural science because of high internal motivation for learning.

The interesting thing from the results of this study is that the achievement in natural sciences of gifted students is not influenced by self-regulated learning. Previous research on self-regulated learning is one of the internal factors related to motivation and learning strategies that affect the academic achievement of gifted students (McCoach & Siegle, 2003; Alsa, 2005). However, in this study, the contribution of self-regulated learning to the academic achievement in natural science of gifted students was very low so that self-regulated learning did not affect the achievement in natural science of gifted students. The cause of the low contribution of self-regulated learning to achievement in natural science can be explained from external factors. The external factor referred to here is the development of internet technology which gave birth to the internet generation with characteristics that do not support the development of self-regulated learning.

Gifted students with IQ above 130 have very high internal motivation in learning (Gottfried, et al., 2005). Internal motivation is part of the dimensions of self-regulated learning. However, as Generation Z, high internal motivation in learning for gifted students is not oriented towards achieving academic achievement. The internal motivation of gifted students to grow the insight on natural science matter is to meet the needs of gifted students to think at higher levels, be creative, independent in learning, group work, and research skills (Taber, 2007). Various studies have shown that gifted students have learning goals to learn (Silverman, 1993), to study to become a master in the field of interest, not to get academic achievement in that field (Nicholls, 1984).

As it is known that in learning activities there are two goals, namely: learning (mastery) goals and performance goals. The purpose of learning (mastery) goals is to develop competence (Kaplan & Maehr, 2007). Students with learning (mastery) goals will develop themselves and grow in accordance with behaviors related to achievement and engagement with assignments. Learning with performance goals aims to demonstrate their competence. Students who will be oriented towards academic achievement will actually avoid challenging assignments because they are anxious about failure (Dweck & Leggett, 1988). Research showed that these two learning objectives are negatively correlated (Nicholls, 1983). This means that the higher the learning (mastery) goals, the lower the performance goals, or vice versa.

It appears that gifted students are more oriented towards learning (mastery) goals so that they prioritize the development of their competencies rather than achieving academic achievement (performance goals). Gifted students interpret learning activities do not have to be correlated with academic achievement. It is also found in Chan's research (2009) that gifted students have learning goals that are more oriented to learning (mastery) goals than performance goals. So gifted students use self-regulated learning to become masters in natural science instead of achieving academic achievements in natural science. Academic achievement is a measure of success set by the authorities in schools, not the needs of gifted students.

There are differences in learning objectives between gifted students with teachers and parents. This difference in learning objectives occurs because of differences in views on learning objectives between generation Y, namely parents and teachers and generation Z, gifted students. Gifted students are more oriented towards learning goals than performance goals. This affects the achievement in natural science of gifted students. If gifted students are more oriented towards learning goals, they do not consider important achievement in natural science of gifted students.

Learning goals and self-regulated learning have a positive correlation. Gifted students who have learning goals to learn will carry out higher self-regulated learning activities (Pintrieh, 2000). So, based on the relationship between self-

regulated learning and learning goals, it can be explained why self-regulated learning has no effect on academic achievement in science subjects for gifted students. Self-regulated learning and learning goals essentially have the same goal, which is more oriented towards self-development rather than academic achievement. Not surprisingly, even though gifted students have high self-regulated learning, achievement in natural science is not always high.

The influence of personality on academic achievement has been widely studied (Caprara et al., 2011). Personality affects the attractiveness of individuals to the choice of activities. For individuals with certain personalities, achieving high academic achievement is something interesting. Conscientiousness and openness of dimension were strong predictors of academic achievement. This also happens to gifted students. Academic achievement of gifted students can be predicted based on their personality type, especially conscientiousness and openness (Mammadov, 2016). The personality of gifted students as generation Z is an open personality. Gifted students as generation Z are individuals who are open in thinking and social interaction so that gifted students have characteristics as independent and self-taught learners. It appears that gifted students have the character of being true learners and opening up opportunities for achievement in natural science.

Self-regulated learning in gifted students is influenced by mother involvement and teacher interaction, but is not influenced by father involvement and peer support. This shows that social environmental factors that influence the self-regulated learning of gifted students, especially from mothers and teachers. As it is known that self-regulated learning is a behavior that is learned from the social environment. This strengthens the theory that explains that self-regulated learning can be taught, learned, and controlled (Zimmerman, Bonner, & Kovatch, 1996). Mother involvement in learning and teacher-student interaction with gifted students contribute to teaching the use of self-regulated learning. Students learn various learning strategies from mother involvement and teacher interaction in learning.

Mother involvement in learning is a multidimensional activity. Mothers are involved in school activities, accompany learning at home, and instill values that contribute to learning activities (Preston, 2008). Thus, mother involvement includes activities related to school, developing cognitive potential, and monitoring children's learning activities at school (Grolnick, Benjet, Kurowski, & Apostoleris, 1997). It appears that the mother's activities will help the child to use metacognitive abilities, maintain motivation, and strive to create a conducive environment for learning.

Research conducted by Kim & Hill (2015) shows that the involvement of fathers and mothers has an equally strong contribution to children's learning achievement, but mothers have higher involvement than fathers. This is proven in this study. Mothers were more active in home-based engagement and intellectual enrichment. This encourages the development of self-regulated learning in gifted students. Mother is able to become a model, strengthen, and choose self-regulated learning strategies for gifted students. According to the explanation of Zimmerman, Bonner, & Kovatch (1996) that self-regulated learning can be taught, learned, and controlled. Mother as the closest social environment serves to set an example and strengthen self-regulated learning activities (Reis & Greene, 2014).

In addition to the involvement of mothers, self-regulated learning of gifted students is influenced by teachers-students interactions. Teachers-students interactions are positively correlated with self-regulated learning. The quality of teacher-student interaction is one of the most important factors affecting the emotional health and learning of students while at school. If students have positive interactions with teachers, they have a positive attitude to learning, are more involved in learning, and become more self-regulated (Omrod, 2008).

Teachers as one of the main actors who create sociable ambience for gifted students have the ability to teach, model, and appreciate various efforts made by gifted students in increasing their self-regulated learning activities (Reis & Greene, 2014). Teachers can improve self-regulated learning of gifted students by providing feedback, provide alternative learning strategies, serve as models in implementing effective learning strategies, and control their learning activities (Zimmerman, Bonner, & Kovatch, 1996).

Teachers are the creators of students' social ambience who have the best capability to understand the potential of gifted students. Such ability becomes the basis for teachers to design learning activities according to the needs of gifted

students. Teachers also teach various appropriate learning strategies, provide examples of practicable learning strategies, and provide reinforcement for learning strategies that have been practiced by gifted students. The results of this study strengthen the theory that explains that teachers can improve the self-regulated learning of gifted students by providing feedback, alternative learning strategies, as well as models in implementing effective learning strategies and controlling learning activities (Zimmerman, Bonner, & Kovatch, 1996). This fact shows that teacher and student interactions have an important role in increasing self-regulated learning (Dignath and Büttner, 2008).

Self-regulated learning of gifted students is not affected by father's involvement due to paternalistic culture, job characteristics, father's time, and mother's occupation. In Javanese civilization which is paternalistic in nature, fathers is in charge of making a living instead of taking care of the children. Everything related to child care is mothers' task (Renk, et. al., 2003). Parenting is also related to childrens' learning activities of which responsibilities are handed over to the mothers. This study illustrates that the involvement of mothers in learning is higher than the involvement of fathers. Yeung (2012) explained that in Asia, fathers spend less time with their children. This also happened in Indonesia, especially in East Java, namely Surabaya, Sidoarjo, and Malang, which were dominated by the Javanese.

Father involvement in learning is also influenced by the characteristics of the father's work. Father's time flexibility is determined by father's job characteristics. If the father has more time to work, the father's involvement in learning decreases (Doherty & Beaton, 2004). Father involvement in children's learning requires adequate amount of time allotment. Gifted students have fathers with less flexible jobs, such as becoming doctors, auditors, managers, employees of State-Owned Enterprises, and soldiers. This causes a decrease in the contribution of fathers' involvement in children's learning.

The results of this study explain that the self-regulated learning of gifted students is not influenced by peer support. This is in accordance with research conducted by Laka (2015). Laka showed that peer support has no direct effect on self-regulated learning. According to Laka, self-regulated learning is influenced by internal factors such as self-efficacy and mastery goal orientation. This means that the factors that directly influence the self-regulated learning of gifted students are self-efficacy and mastery goal orientation instead of the support of friends.

Bandura (1997) says that self-efficacy is basically the result of cognitive processes in the form of decisions, beliefs, or awards about the extent to which individuals estimate their abilities to carry out certain tasks or actions needed to achieve the desired results. Self-efficacy factor plays together with environment, pre-established habit, and other personal variables, especially the expectations of outcomes which may further produce certain behavior. Self-efficacy will affect several aspects of an individual's cognition and behavior. Self-efficacy leads to different trait among individuals with the same ability because self-efficacy affects one's choices, goals, problem solving, and persistence in trying to reach his or her achievement (Zimmerman, 2000).

Mastery goal orientation is the purpose of learning to learn, namely learning to achieve learning goals. Exceptionally intelligent students who have a learning goal to learn will develop new skills, try to understand learning activities, improve their level of competence, or achieve a sense of mastery based on personal standards. Self-efficacy and mastery goal orientation are manifestations of the metacognitive and motivational dimensions of self-regulated learning. So gifted students develop self-regulated learning abilities based on self-confidence and learning goals for learning not because of the support of friends. This causes peer support does not predict self-regulated learning of gifted students.

Peer support is needed by gifted students to meet their emotional needs. Meeting the emotional needs of peers is realized by providing friendship support in the form of appreciation and friendship for gifted students. As teenagers, gifted students need peer support to meet their emotional needs. Gifted students want to be accepted by their peers. Support from friends is needed not to increase self-regulated learning in gifted students, but to get their emotional needs fulfilled. It is important for gifted students to develop positive self-concepts, both in academic and social contexts.

Peer support for gifted students is more frequently received from the peers from special classes. In accordance with the research by Rogers (2002) who concluded that there is a good correlation between gifted students and their peers

in special classes. This means that gifted students do not have social problems with their classmates, who have the same potential. They respect, honor, and understand each other because they have the same level of intelligence as well as identity. However, it does not mean that gifted students do not get emotional needs from their peers who are sitting in regular classes. In this study, gifted students also came from regular classes. Peer support is also received by gifted students as well as from peers in regular classes. As the internet generation, friendship is getting more intense because gifted students do not only interact in the real world but also in cyberspace. Meeting the emotional needs of peers becomes the primary need for gifted students during adolescence.

Gifted students who are in their pre-adolescent phase need peers like their fellow teenagers to develop their attitudes and values, social skills, and get social support (Disti, 2006). Positive influences related to support and nurturance are given by students in interactions with their peers. The interactions with their peers have certain level of contribution to the growth of children's self-esteem as well as develop their social understanding when in the age of pre-adolescent, i.e. when they are comparing between their own views about themselves and the views aired by their friends (Arnett, 2013). Feeling of being honored, respected, and understood by peers is a psychological capital that will contribute to the achievement in natural science of gifted students

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