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The Influence of Parental Involvement and Teacher Support on Mathematics Engagement among Chinese Secondary School Students

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This study aimed to identify two factors that influence student mathematics engagement among Chinese secondary school students. A total of 215 form four Chinese Secondary School students were randomly chosen for this study. The findings of this study revealed students were engaged in mathematics with an overall mean of 3.24 (SD = .33). They were more engaged in behavior (M = 3.34, SD = .50) followed by cognitive (M = 3.24; SD= .33) and affective (M = 3.19, SD = .340) domains. Students received good support from teachers (M = 3.57, SD= 0.70) and parents (M=3.06, SD= .60). Correlational analysis showed moderate positive relationships between teachers' support (r = .471; p < .001) and parental involvement (r = .433; p < .001) with students' mathematics engagement. Further analysis indicated these two factors influenced students' mathematic engagement in the classroom. This study provides evidence on the importance of teacher support and parental involvement to increase students' mathematics engagement in the classroom. The findings of this study indicate that teacher support has greater influence as compared to parental involvement.

Key words: *Cognitive engagement, affective engagement, behavioral engagement, parental involvement and teachers support.*

Introduction

Many people hold a traditional perception that the Chinese are better in Mathematics. This is evidenced of the presence of a stereotyped classification for different races with regard to different subjects. The value of perception is increased by the performance of international

assessments over the past decades, in which East Asian students are reported to have outperformed their Western counterparts (Leong, 2008; Mullis *et al*., 2012; Norton & Zhang, 2013). The exploration on the conceivable causes for the Chinese students to achieve an outstanding performance in Mathematics has been ongoing over the past decade. A vast amount of literature review shows that student characteristics, perceptions, attitudes, motivation and behaviours play an important role in their academic achievement. A positive engagement in studies is linked to the positive outcomes of human beings. However, student engagement is affected by a lot of factors in their learning including peers, family background, classroom environment, socioeconomic status, interest and motivation (Mohd Din, 2016; Gopal, 2018; Gopal, 2018). Thus, many educational researchers still place the main focus on identifying factors influencing student academic engagement and continue to search for the reasons that cause significant student failure.

Several studies have shown that student engagement is one of the factors that leads to success or failure in the school context and student engagement can be viewed from various dimensions such as academic, behavioural, cognitive and affective aspects (Furlong & Christenson, 2008; Kortering & Braziel, 2008; Mohd Din, 2016; Gopal, 2019). Student academic achievement is always hypothesised to have a relationship with student engagement in a particular subject. Prior evidence showed that affective and cognitive aspects are highly associated with academic achievement. Many researchers have found that the more engaged students are, the more they learn, retain and store knowledge in their brain in contrast with learning where there is a lack the engagement. Previous studies have shown a direct link between the levels of engagement and academic achievement for particular subject (Finn, 1989; Fredricks, Blumenfeld, & Paris, 2004; Akey, 2006; (Gopal, 2018a; Mohd Ayub, 2017; Salim, 2018; Gopal, 2018b).

Therefore, mathematics engagement occurs when students cognitively apply the Mathematical knowledge inside or outside the classroom, affectively feeling that Mathematics is a fun subject to learn and their behaviour reflects their appreciation in learning Mathematics as they are actively involved in Mathematics activities (Attard, 2012). There are many factors contributing to Mathematics engagement such as self-efficacy, motivation, peer support, parental involvement, learning environment, student cohesiveness, self-concept and teacher support. In this study, we only focused on parental involvement and teacher support to investigate whether the three factors contribute to Mathematics engagement among Chinese secondary school students. Good schools and good homes go together.

Evidence suggests that connections between home and school help students to adjust and learn. Parents boost their children's academic achievement by exposing them to intellectually stimulating experiences, teaching them directly, monitoring homework and communicating with the school. Parents also strengthen ties by volunteering at the school, attending school conferences, requesting information and participating in school governance (McNergney & McNergney, 2008). Parental involvement is a factor related to student achievement. Students

when accompanied by parents, tend to engage more in their studies (Mohd Din, 2016; Deborah, 2018). Stevenson, Lee and Stigler (1986) pointed out that children should be encouraged to engage in studies during elementary school, as it was "too late" to focus on this crucial element during secondary school. They also stated that parents play an important role in children cognitive development and Mathematics is the subject, which emphasises on cognitive abilities. Fan and Williams (2010) found that parental involvement in different dimensions influenced student academic engagement and their intrinsic motivation in Mathematics. Their evidence showed that parent-school communication was positively associated with students' engagement in their studies, however this was still depending upon the content of communication. In addition, they noted that the role of parents in education is crucial to determine student academic success as high expectation is more likely to increase engagement in learning.

Further, Bempechat and Shernoff (2012) suggested that parental involvement not only influences student engagement in their academic studies but that the three variables depended on the frequency of parental involvement in homework, parenting styles and how parents transmit educational values onto the children. The extent of parental, it also increases students' intrinsic motivation. They explained that the relationship between parental involvement and student engagement is high, especially in the affective domain. Scoring high in an examination is the greatest honour of Chinese students as they then please not only themselves and also their parents (Hui, Sun, Chow, & Chu, 2011). Chinese students know what they want to achieve and they will put greater effort to compete with others in order to get the honour of becoming top students in their school and to satisfy themselves.

The teacher in a classroom plays a crucial role of transferring knowledge to the students. Although children can learn independently by themselves without a teacher, the results will be much better if the teacher plays the role as a "leader" in the classroom (Stevenson, Lee & Stigler, 1986). In the process of learning Mathematics, some teachers believe that learning Mathematics is a silent activity where students have to produce their "own work"; however some teachers prefer group discussions among their student cohorts (Orton, 2007). Nevertheless, teacher intervention is inevitable. A study by Archambault, Janosz, and Chouinard (2012) revealed that teacher belief directly influences student academic engagement. They concluded that when teachers have high expectancy of students, they put in more effort to help their students to succeed in Mathematics. Further, teacher belief also promotes low-SES student engagement in Mathematics although it does not have any apparent effects on their results. This situation explains that teacher belief is effective in helping students to learn Mathematics. Therefore, teachers must always be aware that they can play a positive role in their students' learning.

It was essential to conduct this study to investigate the influence of parental involvement and parental support on student engagement, especially among Chinese secondary school students because past studies have indicated that there are different types of culture in Chinese families. Previous studies have shown the importance of these two factors not only on academic engagement but also on academic performance

Objectives of the Study

The objectives of the study are

1. To assess mathematics engagement among Chinese secondary school students.
2. To assess parental involvement and teacher support among Chinese secondary school students.
3. To determine the relationship between parental involvement and teacher support with mathematics engagement among Chinese secondary school students.
4. To determine the influence of parental involvement and teacher support towards mathematics engagement among Chinese secondary school students.

Methodology

This study aims to determine the factors influencing Chinese secondary school students' engagement in Mathematics. Therefore, the appropriate research design used in this study is the descriptive correlational design. A descriptive correlational study helps the researcher to determine the degree of relationship or predict certain outcomes between two or more variables by using correlation coefficient (Fraenkel, Wallen & Hyun, 2012). For the purpose of the study, a total 215 of form four respondents were randomly selected from five Chinese secondary schools from different states in Peninsular Malaysia. The researcher believes that the selected sample share the common criteria of Chinese secondary schools.

For the purpose of data collection, the researcher used a questionnaire to examine respondents' opinion and perception. The questionnaire used in this study consists of three sections. Items of background consist of gender and grade for the Mathematics subject in Lower Secondary Assessment. The next section intends to measure parental involvement and teacher support in learning Mathematics among Chinese secondary school students. This section consists of 14 items, which each dimension comprising seven items. Items measuring parental involvement were adapted from Brown (2009) and Mombourquette (2007). This variable measures how their parents encourage them to do homework at home, parent participation in school activities such as meeting with mathematics teachers and how parents guide and discipline their student in the process of learning Mathematics. Meanwhile, Fraser, McRobbie and Fisher (1996) questionnaire was used to measure the dimension of teachers' support which refers to the

support and assist provided by Mathematics teacher in helping his or her students to increase their performance and understanding in Mathematics subject.

The last section aims to measure student engagement in Mathematics, which is the dependent variable in this study using Kong, Wong and Lam (2003) instrument. A total of 57 items were used to measure Chinese secondary school students' engagement in Mathematics. The instrument consists of three dimensions of students' engagement, which are cognitive (22 items), affective (23 items) and behavioural (12 items). Cognitive engagement cognitively measures the extent of students' engagement in learning Mathematics in school. This refers to the intelligence, mental ability, persistence on task, concentration on the teaching of Mathematics teacher and deep understanding of the Mathematics contents inside and outside Mathematics classroom. Meanwhile, affective engagement refers to student response in class during their Mathematics lessons, which includes how the students feels the pleasure of learning Mathematics, their curiosity, emotions and own evaluation in the process of teaching and learning Mathematics.

Lastly, behaviour engagement is measured: the effort, perseverance, as well as concentration, achievement, brainstorming in classroom discussions, completion of assignments and involvement in learning activities. Data was collected using a 5-point Likert scale in both sections indicating whether they strongly disagreed (1), disagreed (2), undecided (3), agreed (4), or strongly agreed (5) with the statements. A pilot study has been conducted to 30 Chinese students from two schools to test the reliability of the instrument. According to Pallant (2007), Cronbach's Alpha, which is between .70 and .90, is considered an ideal range. From Table 1 below, the reliability obtained for each variable is between .75 and .88, indicating that all the items of the research instrument are suitable to be used in this study.

Table 1: Reliability of Research Instrument

Item / Construct		Quantity of Item	Cronbach's Alpha
I.	Parental Involvement	7	.747
II.	Teacher Support	7	.816
III.	Cognitive Engagement	22	.798
IV.	Affective Engagement	23	.804
V.	Behavioural Engagement	12	.879

Findings

These findings begin with the demographic background of the respondents. As mentioned earlier, a total of 215 respondents participated in this study consisting of 110 (51.2%) males and 105 (48.8%) females (as presented in Table 2 below). This indicates that there is a balance in term of the number of respondents of two genders. Majority of the respondents (125 or 58.1%) obtained mathematics grade A in PT3, followed by 14 (6.5%) respondents with grade

B, 20 (9.3%) respondents had grade C and only 6 (2.8%) respondents scored grade D.

Table 2: Demographic Factors

Demographic factors	**Frequency (f)**	**Percentage (%)**
Gender		
Male	110	51.2
Female	105	48.8
PT3 Mathematics Grade		
A	125	58.1
B	14	6.5
C	20	9.3
D	6	2.8
None	50	23.3
Total	**215**	**100**

Mathematics engagement was measured on the basis of three components, viz. cognitive, affective and behaviour. Table 3 below presents the participants mean scores with the standard deviations of the three sub-scales. This study revealed that the overall mean for the students' level of engagement in Mathematics was 3.24 (SD = .33), which indicated that the respondents are quite active in their engagement in Mathematics class either in term of cognitive, affective or behavioural dimension. In terms of mathematics engagement dimension, the highest mean is on the behaviour dimension (M = 3.34; SD = .500). This shows the respondents gave very positive responses when expressing their determination to get good results in Mathematics.

However, in term of discussion in Mathematics class, the respondents showed less positive responses. This gave an overview that the Chinese students are more passive and less interested in the discussions in their Mathematics classroom compared to other aspects. The second highest mean is cognitive engagement (M = 3.24; SD = .33), which shows that the respondents were trying to understand Mathematics and follow what they had learned from the teacher in their Mathematics classroom. In addition, the respondents also regard that rote learning is an effective method in learning Mathematics. For affective engagement, the overall mean is 3.19 (SD = .34) and this gives a picture that the Chinese students highly valued their Mathematics results as these scores determined their achievement in Mathematics. They would feel very nervous when they came across problems that they could not solve especially during Mathematics tests.

The first independent variable, viz. parental involvement (M = 3.06, SD = .60), giving an impression that parents play an important role and that family support is important to encourage the respondents to be fully engaged with Mathematics. For teacher support, the overall mean is 3.57 (SD = .70), indicating that Mathematics teacher plays an important role in supporting his or her students to learn Mathematics. These findings showed an overview that Mathematics

teachers in Chinese schools did provide a lot of support during Mathematics classes.

Table 3: Mean and Standard deviation variables studied

Variables	mean	Standard Deviation
Mathematics engagement (Overall)	3.24	.33
Affective engagement	3.19	.34
Cognitive engagement	3.24	.33
Behaviour Engagement	3.34	.50
Parental involvement	3.06	.60
Teacher support	3.57	.70

The next objective is to determine the relationship between the independent variables (parental involvement and teachers support) with the dependent variable (Mathematics engagement). A Pearson correlation analysis was conducted to determine the relationships between these variables. Table 4 below indicates a moderate positive relationship was also found between teacher's support ($r = .471^{**}$, $p = .01$) and Mathematics engagement and also between parental involvement ($r = .433^{**}$, $p = .01$) and Mathematics engagement. Therefore, the relationship between the two independent variables has been proven to be the factors affecting Mathematics engagement.

Table 4: Relationship between Parental Involvement and Teacher Support with Mathematics Engagement

	Mean of Mathematics Engagement (Correlation Coefficient, r)	Interpretation of Relationship Cohen *et al*. (2007)
Parental Involvement	.433**	Moderate positive relationship
Teacher Support	.471**	Moderate positive relationship

Note: ** significance level $p < 0.01$.

A multiple regression "Enter" method was performed to predict factors that that influencing mathematics engagement. Prior to this, the assumptions for normality, linearity, homoscedasticity, independence of residuals and sample size were already met. The model summary is given in Table 5 below. The coefficient determination was 24.5%, which explained the variation in the Mathematics engagement, was due to the teacher's support and parental engagement.

Table 5: Model summary

R	R Square	Adjusted R Square	Std. Error of the Estimate
0.502	0.252	0.245	0.28234

Table 6 below indicates the influencing factors were statistically significant significance (F (2,198) = 33.044, p=0.000) at 0.05 level. Therefore, teacher support and parental engagement could be a significant predictor for the Mathematics engagement.

Table 6: ANOVA

	Sum of Squares	df	Mean Square	F	Sig.
Regression	5.268	2	2.634	33.044	.000
Residual	15.625	196	0.080		
Total	20.893	198			

Based on the results presented in Table 7 below, there are not many differences in terms of variance of most significant contributing factors to mathematics engagement. Hence, teacher support has contributed 17.3% of the variance in mathematics engagement and parental support explained 17.3% variance in mathematics engagement.

Table 7: Multiple Regression Analysis

	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
	B	Std. Error	Beta		
(Constant)	2.239	0.126		17.740	.000
Parental involvement	0.125	0.038	0.226	3.384	.001
Teacher Support	0.173	0.031	0.372	5.572	.000

Discussion

Student engagement in learning is important in determining academic achievement (Kong, Wong, & Lam, 2003). Analysis of the overall mean revealed that Chinese secondary school students' engagement is at the moderate level. These findings indicate that the existence of Mathematics engagement among Chinese secondary school students, which was either from the dimensions of cognitive, affective or behavioural. Kong, Wong, and Lam (2003) stated that each student came from diverse backgrounds of school system, where they have been practising different learning styles and have different beliefs in learning. Thus, academic engagement and time spending to learn are different from each other. Many previous studies have discussed about student engagement in learning and it came to a phenomenon that the universal education is concerned about this issue. These findings are supported by previous research that looked at

various types of engagement, which operate together, and have the potential to operate at different intensity levels (Kong, Wong, & Lam, 2003). Therefore, it can be concluded that the engagement exists when a student is involved in cognitive, affective and behavioural dimensions.

Parental involvement in learning Mathematics is one of the factors measured in this study. It means the intervention of parents in student learning process such as participating in school activities, checking on student homework and communicating with the teachers to follow up their children's learning progress (Bempechat & Shernoff, 2012). In this study, analysis of the overall mean showed that parental involvement affected students' engagement in Mathematics. This finding is similar with Mo and Singh (2008) who concluded that parental involvement has a significant effect on academic engagement of middle school students and gave an impression that the Chinese parents play an important role in encouraging and supporting their secondary school children in learning Mathematics. This finding is supported by previous studies, which also found a positive relationship between parental involvement in different dimensions and student academic engagement (Mo & Singh, 2008; Fan & Williams, 2010; Hui, Sun, Chow, & Chu, 2011; Bempechat & Shernoff, 2012). The teacher as educator plays a big role in student learning. Teachers used to monopolise the discourse of the classroom and the teacher-centred approach was very common (Abd Hamid, Hassan, Sariah, & Ismail, 2012). However, classes in Chinese schools are now different, and Chinese teachers are incorporating new pedagogical approaches where the teacher does not dominate the class and lesson all the time (Lim, 2007; Leung, 2008).

Among the factors studied in this research, the results show that parental involvement and teacher support are considerable as predictor factors. Parental involvement is effective to a certain extent but there are constraints that prevent them from giving full and undivided attention to their children's learning. This is because most Chinese parents are busy and have less time to check on their children's Mathematics homework. However, teacher support is the main predictor compared to parental involvement. During school hours, students spend more time learning mathematics in school compared to at home, specifically the subject of mathematics. The findings are that the teaching and learning of mathematics process engaged with in collaboration with the teacher and through homework is the most influential factor.

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