

Review Article

HOW TEACHER'S AUTONOMY AFFECT BASIC PSYCHOLOGICAL NEEDS AND STUDENT ENGAGEMENT ON MATHEMATIC SUBJECT?

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Abstract

Students' engagement in mathematics is affected by the social contexts of friends, teachers and parents and the fulfillment of student's basic psychological needs. Teachers' autonomy support in improving students' engagement is essential, especially in mathematics learning. This research is an explanatory quantitative study, This research use one-shot-study design where the researcher collected the individual's data chosen as the subjects in a certain period. The results of this study indicate the partial mediation of the fulfillment of basic psychological needs between the teachers' autonomy support and the students' engagement. This finding implies that teachers should understand better that every student has basic psychological needs which can be fulfilled through teacher autonomy support, which eventually influence student's engagement in learning mathematics. *ASEAN Journal of Psychiatry, Vol. 24 (7) August, 2023; 1-6.*

Keywords: Teacher autonomy support, Fulfillment of basic psychological needs, student's engagement

Introduction

Student learning achievement in Indonesia, especially in mathematics, is still considered very low. It can be seen from the results of the survey conducted by Program for International Student Assessment (PISA) in 2018, which show that Indonesia ranked 75th among the 81 surveyed countries, with a mathematics score of 379 below the international average score, 489 (PISA, 2018). In a similar vein, the survey of Trend in International Mathematics and Science Study (TIMSS) in 2015 revealed that Indonesian mathematics achievement ranked 44th among 49 participants, with score 397 below the international average score 500 [1].

Based the survey that conducted by the researcher with sample 43 high school students in several regions across Indonesia, 52.1% stated that they did not like mathematics. They even suggested mathematics subject should be erased in Indonesia's curriculum. Most of them regard mathematics as a complicated, difficult, and boring subject. Most of them said that when learning mathematics, they tended to prefer sleeping, playing games, chatting, pretending to pay attention, and even defacing their books. The students thought that mathematics would be easy enough to grasp if the teacher explained the lessons in a pleasant way, that in which a game was involved.

The study conducted by Khotimah stated that low engagement in learning mathematics showed by decreasing mathematic's test scores in high school students. Students found difficult to finish math exams, students also stated that the relationship between teachers and students also affects student engagement in mathematics. Teachers who become idols for students will increase student engagement in mathematics for both male and female students. The results of reserach conducted by Ginanjar and Darmawan said that the low of student engagement in mathematics showed by student's unwillingness to ask and answer questions, build discuss with other students and finish the assignment completely [2].

Student engagement is a vital element for students as not only is it needed to master skills taught in school, it helps students adapt to their educational requirements as well. Student engagement is defined as the involvement of constant positive behaviors in and attitudes towards learning activities in class. Student engagement is time and effort showed by students to participate in school's activities and achieve good results in school. Student engagement consists of three aspects, that are behavioral engagement, emotional engagement, and cognitive engagement. Behavioral

engagement refers to the students's participation and engagement in academic and social activities [3]. Emotional engagement refers to the student's behaviors, attachment, value, and affective actions through their class, teachers, and peers in school. Cognitive engagement refers to the student's motivation to learn and used cognitive skills in thinking and learning. There are three social contexts regarded as influential to student engagement especially in mathematics, that are family (parents), teachers, and peers. Interpersonal interaction is considered as important things for students engagement in school and one of the essential interaction is r willingness to listen to their students. Teachers who give autonomy support in classroom, tend to give chances to students to choose and make decisions on learning activities [4,5]. The example of teacher autonomy support in mathematics learning are teachers providing logical/rational explanations of the material provided, giving students opportunities to take initiative and be proactive in class, avoiding rules overly strict on students, and using the suitable learning media.

Previous research findings showed that teacher autonomy support correlates to the improvement of student's learning behaviors and academic achievement, including in mathematics subject. stated that autonomy support positively influences student's engagement, while indicated that teacher autonomy support is correlated with student in mathematics. A significantly result is also found in Wang et al., that teacher autonomy support plays a very significant role and can enhance student engagement in mathematics learning [6-8].

From the perspective of Self-Determination Theory (SDT) every student is a knowledgeable and learning-loving individual, have willingness to internalize knowledge, habits, and values around them but their basic needs should be fulfilled as well When student's basic needs are fulfilled by their social context, students will constructively engaged in learning process. There are three types of basic psychological needs required to boost student engagement in learning, that are the need for relatedness, the need for competence, and the need for autonomy [9].

Teachers autonomy support not only affect the student's autonomy need, but also the need for competence, and the need for relatedness. When the environment gives chances to the students to make a decision and do their chosen activity, it

will affected student's perception about their capabilities. In addition, when a teacher provides freedom and trust, a student feels that they have the capacity to achieve something. Teacher autonomy support also facilitates the fulfilment of the need for relatedness of a student, where they feel appreciated and accepted by their society.

Objectives and hypotheses

Based on the previous theories and research findings, it could be stated that teacher autonomy support and the fulfillment of basic psychological needs influence student engagement. Teacher autonomy support affects the fulfilment of the basic needs which, eventually, affect student engagement. The purpose of this research was to examine the role of the fulfilment of basic psychological needs as the mediator on the correlation between teacher autonomy support and student engagement.

Materials and Methods

Participant characteristics

The participants of this research were 102 student's senior high school with an age range of 15-18 years old.

Instruments

Student engagement: Student's engagement was measured by the engagement scale of Fredricks and Paris (2004), which consisted 16 aitem. This scale using four response categories completely disagree=1, disagree=2, agree=3 and completely agree =4. We tested the engagement scale for it's reliability, finding cronbach alpha value of 0.889 and the validity value range between 0.470-0.619.

Teacher autonomy support

Teacher autonomy support was measured by the autonomy support scale constructed by Kaur which consists of 19 items. This scale measured the student's perception of their teacher behavior, whether the teacher give choices, appreciating the student's ideas and suggestions, and explain the relevance of their class learning activities. The scale has four response categories, completely disagree=1, disagree=2, agree=3, and completely agree =4. We tested the engagement scale for it's reliability and finding cronbach alpha value of 0.881, also the validity value range between 0.334-0.663.

Fulfilment of basic psychological needs

The fulfillment of basic psychological needs was measured by the “feeling I have” scale constructed by Deci and Ryan. This instrument consists of 19 items measured the student’s perception of the fulfilment of basic psychological needs. This scale has four responses categories; completely disagree=1, disagree=2, agree=3, and completely agree=4. We tested the engagement scale for it’s reliability, finding cronbach alpha value of 0.811 and the validity value range between 0.265–0.520.

Datal analysis

The data of this research proceed with analysis technique descriptive, regression, and mediation

analyses. For testing the mediation effect, we used the conditional effect analysis technique with simple mediation model using PROCESS Hayes.

Results

Characteristics of participants

Table 1 showed the students who participated in this study were pre-dominantly female 74.5% (N=76) and male 25.5% (N=26). Most of students were in age 17 with percentage 36.2% (N=37), 21.6% were in age 15 (N=22), 21.6% were in age18 (N=22), and 20.6% were in age 16 (N=21). Most of them were from public schools with 52% (N=53) and 89% from private schools (N=49).

Table 1. Characteristics of participants (N=102).

Demographic Variable	N	%
Gender		
Male	26	25.5
Female	76	74.5
Age		
15	22	21.6
16	21	20.6
17	37	36.2
18	22	21.6
School		
Public	53	52
Private	49	48

General Description of the Research Variables

Table 2 showed the descriptive statistics of teacher autonomy support, fulfilment of basic psychological needs, and student engagement. Teacher autonomy support variable showed mean value M=58.25, SD =8.136. Fulfillment of

basic psychological needs showed mean value M=54.55 and standard deviation SD=7.410. Furthermore, student engagement variable showed mean value M=47.33 and SD=8.104.

Table 2. Descriptive statistics of research variables.

Variables	N	Min	Max	Mean	SD
Teacher autonomy support	102	34	76	58.25	8.136
Fulfilment of basic psychological needs	102	19	75	54.55	7.41
Student learning engagement	102	16	64	47.33	8.104

Based on Table 3, most of students perceived their teacher autonomy support in mathematics was high with percentage 57.8% (N=59), 42.2% (N=42) perceived medium, and 1% (N=1) perceived low. For variable fulfilment of basic psychological needs, most of students perceived

medium with percentage 62.7% (N=64), 34.3% (N=35) perceived high, and 1% (N=1) perceived low. Most of students have high engagement with percentage 51% (N=52), 47.1% perceived medium (N=48) and 2% (N=2) (2) perceived low.

Table 3. The variable categorization.

Variables	Low	N	Medium	N	High	N
Teacher autonomy support	0.01	1	42.2%	42	57.8%	59
Fulfillment of basic psychological needs	0.01	3	62.7%	64	34.3%	35
Student engagement	0.02	2	47.1%	48	0.51	52

Based on the categorization results, it can be concluded that student's perceived that their teacher autonomy support and engagement in mathematics are high. The reasons are most of the students in this study come from schools that have sufficient facilitation, the learning supervision from the principal that scheduled each three months. The situations made the learning process become meaningful because teachers aware that they must fill the student's basic needs. The results of the multiple regression analysis in Table 4 showed that

teacher autonomy support influence student engagement in learning mathematics by 34% with $F(1,100)=51.596$, $p<0.001$, $R^2=0.340$, with coefficient $\beta=0.581$, $p<0.001$. Teacher autonomy support positively affect the student engagement in learning mathematics, that is the higher the teacher autonomy support given by the teachers to students, the higher the student engagement in learning mathematics. Then, the lower the autonomy support given by the teachers to the students, the lower the student engagement in mathematics [10,11].

Table 4. The results of multiple regression.

Independent Variables	R ²	Unstandardized		Standardized	F	P
		β	SE	β		
Teacher autonomy support	0.34	0.581	0.081	0.583	51.596	0
Fulfilment of basic psychological needs	0.09	0.378	0.12	0.3	9.887	0

The autonomy support that students received from the teachers will have an impact on students. Through the teacher's explanation about the reasons why the rules need to be obeyed or why some materials need to be studied, it will help students to understand the benefits for themselves, the result is students did something not just following the teacher's directions. In addition, with students knowing that the teacher is willing to listen their opinions and providing opportunities to choose and make decisions on their own, this will make students feel that they are active individuals, which means that all their actions are carried out of their own. The feeling that students are an active individual makes students more responsible for their actions. Moreover, students also understand the importance of learning activities for themselves, that this will encourage students to participate in learning activities and also have initiative in doing their assignments in class [12,13].

In addition, Table 4 also showed that the fulfillment of basic psychological needs affect the involvement of students engagementt in learning mathematics by 9%, $F(1,100)=9.887$, $p<0.001$, $R^2=0.090$ with coefficient $\beta=0.378$, $p<0.001$. The fulfillment of basic psychological needs positively affects the student engagement in learning mathematics, that is the higher the fulfillment of basic psychological needs of students, the higher the student engagement in learning mathematics. Conversely, the lower the fulfillment of the basic psychological needs of students, the lower the student engagement in learning mathematics.

Based on self-determination theory, basic psychological needs are universal and cross stages of development. Everyone has basic needs and when these basic needs are fulfilled by the social environment, it will bring out the behavior expected. The social environment play important role in fulfilling or not fulfilling these three basic psychological needs. When students received

appropriate treatment from the school environment, a process will occur within the students to evaluate whether their basic psychological needs are filled by the environment or not. Students whose basic psychological needs are fulfilled tend to feel that they are able to carry out learning activities well, thereby increasing their student engagement especially in mathematics.

Furthermore, the results of the mediation analysis presented in Figure 1 showed that the

teacher autonomy support has stronger and more positive effect on student engagement in learning mathematics with $c'=0.5433$, $t=6.303$, $p<0,01$. The indirect effect value proved that the fulfillment of basic psychological needs only partially mediates the relationship between teacher autonomy support and student engagement in learning mathematics with a value of $c=0.038$, $p<0.01$, $LLCI=0.012$, $ULCI=0.100$.

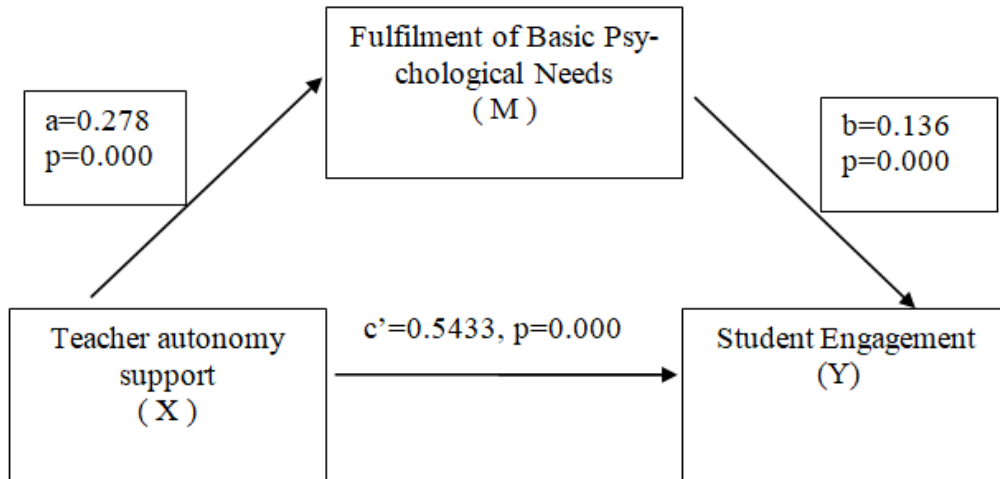


Figure 1. Model 4 Hayes: Teacher autonomy support on student engagement mediated by basic psychological needs

Teacher autonomy support positively affect the fulfillment of basic psychological needs with $a=0.278$ $t=3.761$, $p<0.01$. The higher the teacher autonomy support the greater the fulfillment of the basic psychological needs of students, conversely the lower the support for teacher autonomy, the lower the fulfillment of basic psychological needs. Fulfillment of basic psychological needs positively affects students' involvement in learning mathematics with $b=0.136$, $t=1.247$ $p<0.01$. This means that the higher the fulfillment of students' basic psychological needs, the greater student engagement in learning mathematics, then the lower the fulfillment of students' basic psychological needs, the lower the student engagement in learning mathematics [14,15].

Discussion

Based on the Figure 1 above, it can be concluded that the more positive the student's appreciation of the teacher autonomy support, the more students will perceive their basic psychological needs fulfilled. These can be seen from student's feeling that she/he accepted by others, feeling themselves capable and free to express their self.

The existence of these feelings in students will make the higher student engagement in learning mathematics. Conversely, the more negative the student's appreciation of teacher autonomy support, the more students will perceive their basic psychological needs not fulfilled. These can be indicated by the student's feeling that she/he is not accepted by others, feeling themselves unable and feel that they don't have freedom to express themselves, then students will have low engagement in learning mathematics.

The results of this study support previous research which stated the importance of teacher autonomy support in fulfill basic psychological needs and later will form students engagement, especially for more engage in math lessons.

Conclusion

It can be concluded that student engagement in mathematics is affected by how much their teacher provides them with autonomy support and how the students perceived the fulfillment of their basic psychological needs. Their perceptions determine how engaged they are in mathematics learning. It is recommended that the

outcome of this research will be the base of educational evaluation system, especially the process of learning mathematic in Indonesia. Teachers develop their autonomy support and fulfill the students' basic psychological needs through an attractive and pleasant learning process, as the students will actively engage in mathematics learning.

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