Mediating Teaching Styles of Teachers and Student Adjustment: The Role of Understanding Mathematics Classroom Instruction

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Abstract: **Student adjustment problems are prevalent in all levels of education and was seen to be a significant factor on student success. Thus, this study aimed to identify if there exist a significant relationship between teaching styles of teachers, student adjustment and understanding mathematics classroom instruction. Also, this envisions to identify if understanding mathematics classroom instruction can mediate the relationship between the teachers' teaching styles and adjustment of students. This correlational study uses a quantitative, non-experimental research design to identify the significant relationships among the variables and the mediating effect of understanding mathematics classroom instruction on the relationship between teaching styles of teachers and student adjustment. Adapted questionnaires were given to second year college students in three private tertiary schools in the component cities of Davao Del Norte, Philippines, of which, 400 were randomly selected as sample of the study. The gathered data were analyzed using Pearson-r, Multiple Regression Analysis, and Medgraph using the Sobel z-test. The results revealed a significant relationship between teaching styles of teachers and student adjustment, teaching styles of teachers and understanding mathematics classroom instruction, and understanding mathematics classroom instruction and student adjustment. Furthermore, the result of the medgraph using Sobel z-test of understanding mathematics classroom instruction on the relationship between teachers' teaching styles and student adjustment was significant but partial. In conclusion, the three variables have significant relationships and the mediating variable partially mediates their relationship. Nevertheless, understanding mathematics classroom instruction aided teachers to adapt their teaching styles to help students adjust in a mathematics classroom.**

Keywords: **teaching styles, student adjustment, understanding mathematics classroom instruction**

I. INTRODUCTION

Adjustment problems are cited as the most common issue for first-year students who enter college for the first time (Ababu, Yigzaw, Besene & Alemu, 2018), as it is never easy to find yourself in a new environment with expectations to meet (Stoklosa, 2015). Every year students face different adjustment challenges primarily because of the transition of classes and teachers (Birzina, Cedere & Petersone, 2019). The failure to adjust was found to cause mental issues or school refusal, or school dropping out. Furthermore, maladjustment leads to disturbing lifelong impacts on a student's personality (Lakhani, Chandel & Jain, 2017). Several studies have focused on the adjustment of international students (Brunsting, Zachry & Takeuchi, 2018; Gibbs, 2011; Jackson, Ray & Bybell, 2013; Mesidor & Sly, 2016) as well as its issues not only in primary education (Buyse, Verschueren, Verachtert & Van Damme, 2009) and undergraduate (Woosley & Shepler, 2011; Galatzer-Levy, Burton & Bonanno, 2012) but also in graduate students as focused by Nguyen & Larson (2017). These findings imply the importance of studying student adjustment at all levels. It was found that student adjustment is a good predictor of college grades and college retention (Crede & Niehorster, 2012).

In the Philippines, students who have poor academic adjustment also have poor academic achievement (Alipio, 2020). Additionally, students were found to have poor social adjustment (Hernandez, 2017). The findings showed that these Filipino students could adjust to college life faster in terms of academic and emotional aspect however finds it difficult and takes longer to adjust socially. On this note, no significant relationship exists between social adjustment and academic performance (Seetha, 2009).

Moreover, considering the importance of student adjustment, factors affecting it should be thoroughly considered. Teachers' teaching styles were shown to affect the adjustment of students, especially learner-centered teaching styles (Khandaghi & Farasat, 2011). Past researchers (Baafi, 2020; CORD, 2010; Gresham, 2007) claimed that teaching styles employed by teachers affect students. The teachers can influence how students perceive the class by their ability to instill behaviors to follow (Jepsen, Varhegyi, & Teo, 2015), and Schenke et. al. (2018) explained the relationship between instruction and student perception. Teachers are undoubtedly one of the most influential people in delivering effective education, especially in mathematics (Carroll, Bradley, Crawford, Hannant, Johnson & Thompson, 2017; Sen, 2017). Furthermore, a positive relationship between students' perceptions and student adjustment was noted by Coyle, Demaray, Malecki, Tennant and Klossing (2017).

Identifying what affects student adjustment is very important because successful academic performance lies in it (Lakhani et al., 2017) and their retention in college (Robbins, Oh, Le, & Button, 2009). Due to the scarcity of information on the impact of teaching styles of teachers on their adjustment, more

empirical studies are necessary to provide evidence on the potential effect of teaching styles of teachers on student adjustment that transitioned from primary education to college since most of the related studies conducted were mostly about international students' adjustment. Additionally, there is no analysis on how understanding mathematics classroom instruction mediates the relationship between teachers' teaching styles and student adjustment. Thus, this study aims to determine if there exist a significant relationship between teaching styles of teachers and student adjustment, teaching styles of teachers and understanding mathematics classroom instruction and understanding mathematics classroom instruction and student adjustment. Furthermore, this also aims to identify if the understanding of mathematics classroom instruction can significantly mediate the relationship between teachers' teaching styles and student adjustment.

This study may benefit policymakers, school administrators, program heads and teachers to create a learning environment accepting and supportive of students with these prevailing scenarios. It will also help teachers establish awareness of how adjusted the students are concerning how they perceive their teachers' teaching style. The result will also contribute to the existing body of knowledge on factors affecting student adjustment.

II. METHODS

Research Design

This study utilized a quantitative, non-experimental research design with a correlational technique to determine the significant mediating effect of understanding mathematics classroom instruction on the relationship between teaching styles of teachers and student adjustment. Quantitative research is a way to test objectives by examining the relationship between variables and non-experimental because the study used a survey to gather data (Creswell, 2009). Quantitative research also attempts to explain the causal relationship between variables in the study (Creswell, 2005).

The research begins with a theory, forms a hypothesis based on an idea, and then tests the theory (Cresswell, 2005; Maxwell, 2012). The researcher will gather the data through survey questionnaires using an identified sample of respondents. Using questionnaires is one of the best methods of gathering numerical data in quantitative research. (Dube, 2010; Mersdorf, 2016).

Additionally, this study is non-experimental because the researcher will not control, manipulate, or alter the predictor variable or subjects but instead relies on interpretation, observation, or interactions to conclude (Kowalczyk, n.d.). Thus, this study does not involve treating or changing the data. Moreover, this study will use a correlational technique to establish relationships among variables and describe them with their direction, either positive or negative (Trejo, 2013). The researcher identified the connections of this study's mediating, independent, and dependent variables and checked and interpreted them to determine emerging trends and patterns.

Finally, this study employed path analysis between the three variables. Path analysis is a proper statistical analysis technique that helps understand the causal effect of two or more independent variables on a dependent variable. The path analysis shows the magnitude of influence of the independent variable on the dependent variable via the mediating variable and whether the relationship has remained significant or not (Allen, 2017; Crossman, 2020).

Research Locale

The researcher conducted the study on three private tertiary schools in Davao Del Norte, Panabo City, Island Garden City of Samal, and Tagum City. Panabo City is one of the three cities comprising Davao Del Norte categorized as a third component city. The city consists of 40 barangays situated on more than 25 000 hectares of land. The town's main product is banana cultivation and exportation, thus giving it the nickname "Banana Capital of the Philippines". On the other hand, the city housed several private schools, most situated in the center of the town, with private schools offering primarily tertiary education.

On the other hand, the Island Garden City of Samal, otherwise known as IGaCoS, is an island city that belongs to Davao Del Norte, which comprises a central island and seven islets. It boasts 118.5 kilometers of long continuous coastline and numerous resorts. In Davao Del Norte, the island has the most barangays, which counted to 46 in three different districts: Babak, Peñaplata, and Kaputian, situated on more than 30 000 hectares of land.

While Tagum City, known as the Palm City of the Philippines and the capital of Davao Del Norte province, has a population of 259 444 as of the 2015 Philippine Census. The city has 23 barangays sitting on 19 580 hectares of land territory. Figure 1 shows the map of the Philippines and the location of the town.

Population and Sample

The respondents of this study were 400 second-year college students enrolled in tertiary private schools in the three-component cities of Davao Del Norte. These 400 students were samples of the study. The researcher chose them without any requirements regarding the respondents' age, sex, or ethnicity as long as they are studying in the current semester. The respondents were selected because they are already capable of critical thinking and reasoning, and they can deduce ideas based on their experience and observation (Aquino, 2015).

Additionally, mathematics teachers handled these students within the school year 2019-2020, particularly in the course Mathematics in the Real World. Only students who had a mathematics class participated as respondents. These students were able to experience firsthand the teaching styles employed by their teachers while teaching mathematics in the classroom. They were also able to observe instructions in the school. However, absent or unavailable students cannot participate as respondents during the questionnaire administration. If respondents felt that they could not discuss some information about the study, the students were then free to withdraw their

participation. There was no penalty for those respondents who refused to partake in the survey.

This study employed the total population sampling, which included all second- year students who had a mathematics course from 2019 to 2020 in the three tertiary private schools in Davao Del Norte. Etikan (2016) defines total population sampling as a purposive sampling that was the thoughtful choice of participants because of the qualities the participants own. The researcher chose the participants due to their knowledge and experience relevant to the study.

Figure 1. Map of the Philippines highlighting the Research Locale.

Research Instrument

The researcher used three sets of questionnaires in this study that were adapted from previous studies on the variables used. Additionally, to ensure that the questionnaires were suitable for the study, the three sets undergo content validity and reliability analysis. The Cronbach Alpha for the independent variable is 0.972, 0.923 for the dependent variable, and 0.929 for the mediating variable. These Cronbach alpha values indicated that the internal consistency of the questionnaire had surpassed the minimum value of 0.70 (Gliem and Gliem, 2003).

Experts in research and statistics validated the first drafts of the questionnaires. They were validated and earned an overall rating of 3.89, described as an excellent validity index. The comments, corrections, and suggestions of the panel of experts were incorporated to have the final version of the three questionnaires. These then were used in the pilot study, which included 30 respondents.

The questionnaire for the independent variable, teachers' teaching styles had six indicators: instructional planning, teaching methods, teaching environment, evaluation techniques, teaching characteristics, classroom management, and educational philosophy. In addition, this questionnaire will is rated using the 5-point Likert Scale from 1 (Never/Not At All/Strongly Disagree) to 5 (Always/Extremely/Strongly Support).

The Understanding Mathematics Classroom Instruction questionnaire had 21 questions, and the questionnaire used a 5-point Likert Scale from 1 (Strongly Disagree) to 5 (Strongly Agree).

Lastly, the dependent variable, student adjustment, had the following indicators: academic efficacy, social efficacy with peers, classroom engagement, and disruptive behavior. The options for this questionnaire range from 1 (not at all valid for me) to 5 (very accurate for me).

Data Collection

The researcher took the following steps in the conduct of this study. First, the researcher presented her idea to her adviser and found the appropriate survey tools to measure the mediating effect of understanding mathematics classroom instruction on the relationship between teaching styles of teachers and student adjustment. Second, the researcher first asked the target participant schools (casual) about the number of students enrolled for the second year of the current semester to verify that there were enough participants from the three institutions. Third, the questionnaires mentioned above were presented to the research adviser for comments, then later to the panel experts. Fourth, validation sheets were then secured from the Professional Schools for the research experts, internal and external, to validate the three sets of questionnaires. When validation was done, and the corresponding corrections and suggestions were incorporated, a pilot test was conducted to test the internal consistency of the instruments. The result of the pilot test was then submitted to the designated PS Statistician for the Cronbach's Alpha. Fifth, the researcher has submitted her manuscript to the Ethics Review Committee of the University for review and approval. After the ERC approved the research manuscript, the researcher sent a request letter to conduct the study noted by the research adviser and signed by the Dean of the Professional Schools. The researcher personally handed the letter to the authorized personnel of the private schools. The approved request letters were used as attachments in sending the letter to the program heads, the letter to respondents, and the three questionnaires. The actual survey took place on December 7-10, 2020. The researcher administered the survey using Google Forms.

All data collected for this research were secured to safeguard confidentiality, especially during periods when the data was being transported, and since the survey was conducted through an online platform (Google Forms), a separate private email was used to ensure the safety of the data. The researcher ensured that identifying information such as names was stored separately from other personal information collected as part of the research; these were secured and stored in a password-protected computer. Further, the gathered information was not even be passed on to random people. Alternatively, it means the information can be used, but people's names and other identifying features of the situation were removed. Eventually, paper records were disposed of in a manner that leaves no possibility for the reconstruction of information, such as burning or shredding then cross shredding.

The gathered data of survey responses were tabulated and placed by the researcher in an Excel spreadsheet and then emailed to the statistician for statistical treatment. The descriptive statistics, including mean and correlation, were used to measure the level and relationships of the variables involved in the study.

Statistical Tools

The following statistical tools were used to interpret the data gathered appropriately.

Mean was used to measure the levels of teaching styles, understanding of mathematics classroom instruction, and student adjustment.

Pearson Product Moment Correlation was utilized to determine the relationships between teachers' teaching styles, understanding of mathematics classroom instruction, and student adjustment.

Multiple Regression Analysis was used to measure the influence of teaching styles of teachers and understanding of mathematics classroom instruction on student adjustment.

Medgraph using Sobel z-test was used to determine the mediating effect of understanding mathematics classroom instruction on the relationship between teachers' teaching styles and student adjustment.

III. RESULTS AND DISCUSSION

This section presented the data and the analysis of findings based on the responses of the respondents on teaching styles of teachers, understanding mathematics classroom instruction, and student adjustment among college students. The order of discussions was as follows: level of teaching styles of teachers, level of student adjustment, level of understanding mathematics classroom instruction, the correlation between teaching styles of teachers and student adjustment, teaching styles of teachers and understanding mathematics classroom instruction, understanding mathematics classroom instruction and student adjustment and mediation analysis results.

The statistical tables indicated that the standard deviation ranged from 0.52 to 0.80. These are close to 1.0, which denotes those values around the mean are concentrated (Nasir & Iqbal, 2019). This meant that the scores obtained in this study were close to the mean, indicating consistency of responses.

Level of Teaching Styles of Teachers

Table 1.
Level of Teaching Styles of Teachers

Indicator	SD	Mean	Descriptive Level
Instructional Planning	0.56	4.09	High
Teaching Methods	0.60	4.16	High
Teaching Environment	0.63	3.98	High
Evaluation Techniques	0.65	4.09	High
Teaching Characteristics and Classroom Management	0.60	4.17	High
Educational Philosophy	0.57	4.25	Very High
Overall	**0.52**	**4.12**	**High**

In Table 1, the level of teaching styles of teachers has an overall mean of 4.12 with a standard deviation of 0.52 and a descriptive level of high. This means that the measures relating to the teaching styles of teachers are oftentimes observed.

The indicator with the highest mean for teaching styles is educational philosophy described as very high. This means that the educational philosophy of teachers is always observed by the students. This result is followed by teaching methods with a descriptive level of high and means that the items are oftentimes observed. On the other hand, the lowest indicator is teaching environment. The result is still high and means that it is oftentimes observed; however, it is the only indicator that had a mean of below four. Taken as a whole, it is inferred that students can always observe the educational philosophies of their teachers in the way they teach them in class. At the same time, the teaching environment could be affected by the set-up of the current classroom that they use during sessions, especially that in the tertiary level; the rooms are simple because numerous classes are being held in one area.

Level of Student Adjustment

Shown in Table 2 is the level of student adjustment with an overall mean of 4.02, described as high with a standard deviation of 0.56. This means that measures of student adjustment are oftentimes observed.

Table 2.
Level of Student Adjustment

Indicator	SD	Mean	Descriptive Level
Academic Efficacy	0.80	3.66	High
Social Efficacy with Peers	0.76	3.70	High
Classroom Engagement	0.64	4.38	Very High
Disruptive Behavior	0.62	4.34	Very High
Overall	**0.56**	**4.02**	**High**

Among all the indicators, classroom engagement got the highest mean which is described as very high, followed by disruptive behavior, which is also very high, then social efficacy with peers, which is described as high, and lastly, academic efficacy got the lowest mean but still described as high.

Considering the very high result of classroom engagement, it can be determined that the students are trying their best to get involved in their class and pay attention to the discussion. This also correlates with the result of disruptive behavior, where students do their best not to commit any act that could be labeled as disruptive when they are still having their discussion in the classroom. Even though academic efficacy is still high however it got the lowest mean; perhaps this is because the items in academic efficacy are somehow into the self-belief of students that they can master a math skill though it is hard. Considering the results for student adjustment, it can be inferred that respondents can adjust in their mathematics classroom.

Table 3.

Level of Understanding Mathematics Classroom Instruction

Items	SD	Mean	Descriptive Level
Interesting and keeping my attention is what I feel in this mathematics class.	0.88	3.97	High
Making learning enjoyable is what my math teacher does.	0.82	4.10	High
Interesting lessons are what my math teacher do.	0.79	4.16	High
Understanding how students feel about things is what my math teacher does.	0.80	4.28	Very High
Respecting my ideas and suggestions is what my math teacher does.	0.75	4.28	Very High
This class is making me feel that my math teacher really cares about me.	0.79	4.19	High
Accepting nothing less than our full effort is what our math teacher does in our class.	0.83	4.24	Very High
Encouraging us to continue when the work is getting hard is what our math teacher does.	0.80	4.30	Very High
Making us use our thinking skills more than memorizing is what our math teacher makes us do.	0.83	4.29	Very High
Making us explain our answers is what our math teacher does.	0.78	4.14	High
Explaining topics in several ways to make us understand is what my math teacher does.	0.80	4.33	Very High
Explaining in several good ways each topic that we cover in class is what my math teacher does.	0.78	4.27	Very High
Explaining difficult things is what my math teacher does.	0.82	4.24	Very High
Asking questions to be sure we are following along when s/he is teaching is what our math teacher does.	0.74	4.35	Very High
Correcting mistakes is what we learn in this math class.	0.77	4.32	Very High
Giving us time to explain our ideas is what our math teacher does.	0.76	4.30	Very High
Summarizing what we learn each day is what our math teacher does.	0.79	4.22	Very High
Checking to make sure we understand what s/he is teaching us is what our math teacher does.	0.79	4.29	Very High
Having comments that I get on my work in this mathematics class helps me understand how to improve.	0.79	4.25	Very High
Getting helpful comments to help us know what we did wrong on math assignments.	0.79	4.28	Very High
Making me a better thinker is what this math class does.	0.81	4.24	Very High

Level of Understanding Mathematics Classroom Instruction

Reflected in Table 3 is the level of understanding mathematics classroom instruction with an overall weighted mean score of 4.24 and a standard deviation of 0.67, which is described as very high. For specific items' results, the highest mean is on how their teacher asks questions to make sure that the students are following along in the topic, with a mean value of 4.35 and described as very high. This item is followed by how their teacher found other ways to explain the subject to make the students understand with a mean score of 4.33 and an item about how students were able to correct their own mistakes in their mathematics class with a mean score of 4.32, both are described as very high. On the other hand, the lowest fell on how their mathematics class can keep their attention and make the students interested with a mean of 3.97 with the descriptive equivalent of high.

Correlations between Teaching Styles of Teachers, Student Adjustment and Understanding Mathematics Classroom Instruction

Shown in Table 4 are the results of the relationship between the independent variable (teaching styles of teachers), dependent variable (student adjustment), and mediating variable (understanding mathematics classroom instruction). Bivariate correlation analysis using Pearson product-moment correlation was used to determine the relationship between the variables mentioned.

Table 4

Correlation Analysis of the Variables

Pair	Variables	Correlation Coefficient	p-value	Decision on Ho
IV and DV	Teaching Styles of Teachers and Student Adjustment	0.545	0.000	Reject
IV and MV	Teaching Styles of Teachers and Understanding Mathematics Classroom Instruction	0.517	0.000	Reject
MV and DV	Understanding Mathematics Classroom Instruction and Student Adjustment	0.711	0.000	Reject

The first zero ordered correlation analysis is between the teaching styles of teachers and student adjustment, shown in Table 4.1. Reflected in the hypothesis, the relationship was tested at a 0.05 level of significance, and the overall r-value of 0.545 with a p-value of 0.000 signified the rejection of the null hypothesis. It means that there is a significant relationship between the teaching styles of teachers and student adjustment. This means that the two variables have a strong positive association (Patil & Modi, 2019).

Table 4.1 Significance of the Relationship between Levels of Teaching Styles and Student Adjustment

Teaching Styles	Student Adjustment				
	Academic Efficacy	Social Efficacy with Peers	Classroom Engagement	Disruptive Behavior	Overall
Instructional Planning	0.420* (0.000)	0.292* (0.000)	0.321* (0.000)	0.350* (0.000)	0.438* (0.000)

Teaching Methods	0.294* (0.000)	0.233* (0.000)	0.340* (0.000)	0.338* (0.000)	0.375* (0.000)
Teaching Environment	0.457* (0.000)	0.321* (0.000)	0.336* (0.000)	0.397* (0.000)	0.479* (0.000)
Evaluation Techniques	0.439* (0.000)	0.376* (0.000)	0.335* (0.000)	0.385* (0.000)	0.488* (0.000)
Teaching Characteristics and Classroom Management	0.484* (0.000)	0.381* (0.000)	0.433* (0.000)	0.464* (0.000)	0.555* (0.000)
Educational Philosophy	0.400* (0.000)	0.346* (0.000)	0.408* (0.000)	0.434* (0.000)	0.498* (0.000)
Overall	**0.480* (0.0000**	**0.376* (0.000)**	**0.418* (0.000)**	**0.456* (0.000)**	**0.545* (0.000)**

Similarly, the second bivariate correlation analysis is between the teaching styles of teachers and understanding of mathematics classroom instruction, shown in Table 4.2. The relationship was tested at a 0.05 level of significance and showed an overall r-value of 0.517 and a p-value of 0.000, significant at a 0.05 level. This result signifies the rejection of the null hypothesis. This means that there exists a strong association between the two variables (Patil & Modi, 2019).

Table 4.2

Significance of the Relationship between Levels of Teaching Styles and Understanding Mathematics Classroom Instruction

Teaching Styles	Understanding Mathematics Classroom Instruction
Instructional Planning	0.427* (0.000)
Teaching Methods	0.385* (0.000)
Teaching Environment	0.404* (0.000)
Evaluation Techniques	0.423* (0.000)
Teaching Characteristics and Classroom Management	0.541* (0.000)
Educational Philosophy	0.512* (0.000)
Overall	**0.517* (0.000)**

*Significant at 0.05 significance level.

Lastly, in Table 4.3, the third correlational analysis is between understanding mathematics classroom instruction and student adjustment, which yielded an overall r-value of 0.711 with a probability value of 0.000, significant at 0.05 level. This shows a strong positive relationship between the mediating variable and the dependent variable (Patil & Modi, 2019).

Table 4.3

Significance of the Relationship between Levels of Understanding Mathematics Classroom Instruction and Student Adjustment

	Student Adjustment				
Understanding Mathematics Classroom Instruction	**Academic Efficacy**	**Social Efficacy with Peers**	**Classroom Engagement**	**Disruptive Behavior**	**Overall**
Overall	**0.510* (0.000)**	**0.358* (0.000)**	**0.709* (0.000)**	**0.739* (0.000)**	**0.711* (0.000)**

*Significant at 0.05 significance level.

Mediation Analysis of the Three Variables

The data in this study were analyzed using the linear regression method as input to medgraph. Baron and Kenny (1986) developed the mediation analysis where the mediating effect of a third variable is tested in the relationship between the independent and dependent variables.

There are four steps to meet for a third variable acting as a mediator. Table 5 shows the four steps. In Step 1, the teaching styles of teachers as the independent variable (IV) significantly predict student adjustment, the dependent variable (DV). In Step 2, teachers' teaching styles (IV) significantly predict understanding mathematics classroom instruction, the mediating variable (MV). In Step 3, understanding mathematics classroom instruction (MV) significantly predicts student adjustment (DV).

Since the three steps (paths a, b and c) are significant, further mediation analysis through medgraph is warranted, using the Sobel z-test to assess the significance of the mediation effect. If the effect of the independent variable on the dependent variable becomes non-significant at the final stage of the analysis, then there is full mediation. It means all the effects of IV are mediated by the mediating variable. Additionally, when the regression coefficient is substantially reduced but remains significant at the end of the final stage, only partial mediation is obtained. This implies that part of the teaching styles of teachers (IV) is mediated by understanding mathematics classroom instruction (MV), but other parts are either direct or mediated by other factors, not in the study. As can be seen in Table 5 (denoted as c'), the effect of teaching styles of teachers on student adjustment was found to have reduced after being mediated by understanding mathematics classroom instruction. With this, partial mediation took place since the effect was found to be significant at a $p<0.05$ level.

Further, the result of the mediating effect is shown in Figure 2. The Sobel test yielded a z-value of 9.046923 with a p-value of 0.000001, which is significant at the 0.05 level. This means that the mediating effect is partial. The original effect of teaching styles of teachers on student adjustment was exerted through the mediator of understanding mathematics classroom instruction while also exerting its effect directly on the dependent variable, not through the mediating variable. This then makes the direct and indirect paths both significant.

Meaning the teaching styles of teachers affect student adjustment with or without the mediating variable of understanding mathematics classroom instruction.

The figure also shows the results of the computation of the effect size in the mediation test conducted between the three variables. The effect size measures how much of the effect of teaching styles of teachers on student adjustment can be attributed to the indirect path. The total effect value of 0.541 is the beta of the teaching styles of teachers towards student adjustment. The direct effect value of 0.252 is the beta of teaching styles of teachers towards student adjustment with understanding mathematics classroom instruction included in the regression. The indirect value of 0.290 is the amount of original beta between teaching styles of teachers and student adjustment that now goes through understanding mathematics classroom instruction to student adjustment (a * b, where "a" refers to the path between TSOT & UMCI and "b" refers to the path between UMCI & SA).

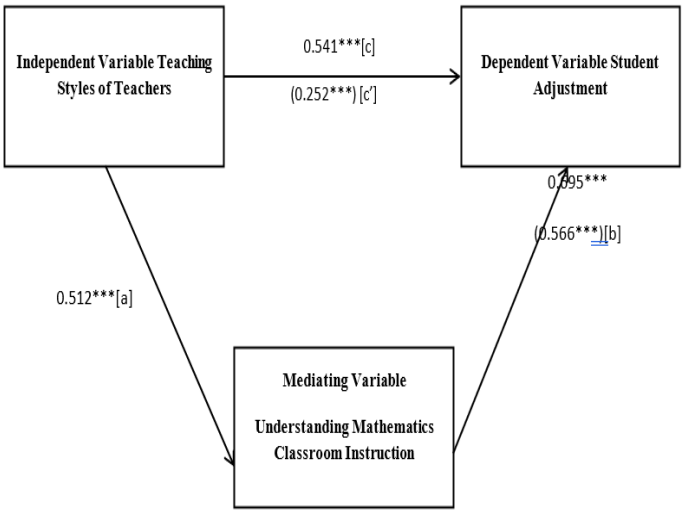
Table 5

Regression results of the variables in the four criteria of the presence of mediating effect

Step	Path	Beta (Unstandardized)	Standard Error	Beta (Standardized)
Step 1	c	0.580	0.045	0.541
Step 2	a	0.652	0.055	0.512
Step 3	b	0.476	0.034	0.566
Step 4	c'	0.269	0.043	0.252

The ratio index is computed by dividing the indirect effect by the total effect; in this case, 0.290 by 0.541 equals 0.5360. It seems that about 53.60 per cent of the total effect of teaching styles of teachers on student adjustment goes through understanding mathematics classroom instruction, and about 46.40 per cent of the total effect is either direct or mediated by other variables not included in the model.

Standardized Coefficients



Mediation Analysis Results:

Significance of Mediation		Significant
Sobel z-value	9.046923	p = < 0.000001
Percentage of the total effect that is mediated		53.5089655
Ratio of the indirect to the direct effect		1.1537249

Effect size Measures

Standardized Coefficients

Total:	.541
Direct:	.252
Indirect:	.290
Indirect to Total Ratio:	.535

Figure 2. Medgraph Showing the Variables of the Study

IV. DISCUSSIONS

Presented are the discussions of data, conclusion, and recommendations on the mediating effect of understanding mathematics classroom instruction on the relationship between teaching styles of teachers and student adjustment with supporting reviews of literature.

Teaching Styles of Teachers

The level of teaching styles of teachers is high; this result is obtained based on the responses of respondents in the areas of instructional planning, teaching methods, teaching environment, evaluation techniques, teaching characteristics and classroom management, and educational philosophy.

The teachers' level of educational philosophy is very high which implies that the philosophy embodied by the teachers are always observed by the respondents in terms of embodying the beliefs of open and humanistic education, behavioral/performance objectives, independent study, student-centered curriculum, matched teaching and learning styles, diagnostic-prescriptive teaching, alternative education, grade-

level standards, whole-group achievement, individualized instruction, traditional education, teacher-dominated instruction, and multiage groupings.

This result is parallel to the study of Aslan (2018), who refers to educational philosophy as an essential factor in many fields that determine the achievement of students. In the study, students were able to recognize the educational philosophies their mathematics teachers embody. Since educational philosophy is the personal value the teachers hold, the result in the level of teaching styles of teachers made a statement on how strong this philosophy is being manifested in the classroom and how the teacher uses this to connect with their students and the teaching community as a whole (Marsh, 2018; Sunley, & Leigh, 2017).

The result further implied that these philosophies manifested by the mathematics teachers have allowed them to take a firm hold of the different situations in the educational process because the students were able to feel it in class. By embodying such beliefs, mathematics teachers become more flexible and adaptable to the changes in the classroom brought about by varying students and needs (Dayagbil, 2021; Tatto & Hordern, 2017).

The high level of teaching characteristics and classroom management indicated that the teaching styles of teachers as experienced by the respondents are oftentimes observed in terms of the teachers' concern with how the students learn, following the lesson plan, what the students learn, with how much the students learn, evaluation of students output, prescriptive with student options, authority-driven to achieve group objectives and to demand with high expectations based on individual ability.

The result is synonymous with the findings of Trader (2020), Aelterman et. al. (2019), Tarbutton (2018) and Ellis et al. (2017), where sound teaching characteristics and classroom management of mathematics teachers in their classes is an effective measure to ensure that the flow of the teaching-learning process in teaching mathematical concepts is running smoothly. The effective classroom management and teacher's teaching characteristic in mathematics class have made students feel that their teacher is concerned if they learn or not the topics and proves to help lessen student disruption (Wiley, 2019).

The respondents also have a high response on the teaching methods of their teachers. The high level of teaching method indicated that teaching styles of teachers are oftentimes observed in terms of lecturing the whole class, having class discussions, giving teaching demonstrations, having individualized diagnoses and prescriptions for each student, organizing small groups, and utilizing media.

The results showed coherence to the findings of Husmann and O'Loughlin (2019) and Paraskevopoulou-Kollia & Michalakopoulos (2021) that when the mathematics teacher uses a teaching method that is aligned to students' preferences in learning maths, the retention of knowledge is maximized, and the higher-order thinking skills (HOTS) of students is improved. This aligns with studies that expressed the importance of matching the teaching styles of teachers and the learning styles of students (Atasoy et. al., 2018; Hajimaghsoodi & Maftoon, 2018; Khan, 2018).

Finally, the result confirms the findings of Değirmenci (2018) along with other authors (Abbas & Hussain, 2018; Cimermanova, 2018; Marsh, 2018; Oznacar, Guven & Yilmaz, 2017) that teaching styles through sound instructional planning (Burden & Byrd, 2019), teaching methods (Husmann & O'Loughlin, 2019; Marsh, 2018), conducive teaching environment, evaluation techniques (Brooks et. al., 2019), teaching characteristics and classroom management (Aelterman et. al., 2019; Ellis et al., 2017; Tarbutton, 2018; Trader, 2020) and educational philosophy (Aslan, 2018; Sunley, & Leigh, 2017; Tatto & Hordern, 2017) ensures the effective delivery of lesson and that can accommodate the needs of the learners.

Student Adjustment

The overall level of student adjustment is high, based on the respondents' responses in academic efficacy, social efficacy with peers, classroom engagement, and disruptive behavior.

Specifically, the respondents have manifested a very high level of classroom engagement, particularly in how they listen carefully and try their best, listen carefully when their math teacher talks about a new topic, and pay attention in their mathematics class. This indicates that measures of student adjustment are always observed.

The very high level of classroom engagement of the respondents causes changes that promote adjustment (Goudih et al., 2018; Ryan & Deci, 2020), which impacts students' understanding and motivation toward class. The results of the study revealed that the more engaged the students are, the better is their adjustment.

The ability of students to engage in classroom activities has been found to be affected by how teachers ask their questions and bring in interactive lectures. Also, doing hands-on activities was also proven to encourage students to be more engaged in class, especially when the teacher is discussing a new topic in subjects like mathematics and science (Jacques et al., 2020; Mellieon & Robinson, 2021).

Similarly, the respondents have a very high level of disruptive behavior (in this study, items about disruptive behavior were scripted positively, so, based on the findings, the respondents do not manifest disruptive behavior). This can be exemplified by their way of always following their mathematics' teacher's directions, behaving in a way that pleases their maths teacher, following classroom rules, and always being on good terms with their classmates in maths class (Jones, 2020).

The result shows that the respondents foster a good relationship with their teacher and classmates in their mathematics class. This follows the findings of Jones (2020), Groccia (2018), Calvert (2017), and ChanLin (2018) that in an academic environment that shows the importance to each member, the manifestation of disruptive behavior is mitigated and decreased (Caldarella et al., 2020). A good relationship between a student and a teacher encourages participation and a positive

relationship and increases student outcomes. Additionally, the eagerness of students to please their mathematics teacher is an indicator of their motivation to go with the majority.

Moreover, the high level of social efficacy with peers is an indication that the respondents try to make friendships with their classmates, as evident by how they get along with most of the students in their mathematics class, how they find it easy to start a conversation with most of their classmates, how they can explain their point of view to their classmates, how they please their classmates and how they find it easy to join other students even when they are already doing something in their mathematics class (Martirosyan et. al., 2019; Mendoza, 2019).

This is parallel to the statement of Schmidt (2020), where the researcher found that the informal relationship that students create in the class leads to friendship and thus leads to study groups. The support that the students give each other helps provide better academic outcomes since, most of the time, these informal relationships that turn into friendships become a foothold to becoming study partners.

Lastly, the high level of academic efficacy is an indication that this measure of student adjustment is oftentimes observed as manifested in how they can learn even their mathematics schoolwork is hard, how they believe that they can do even the most complicated mathematics schoolwork if they try, how certain they are that they can figure out even the most challenging math schoolwork and how certain they are that they can master the skills taught in their mathematics class.

The confidence of the respondents in their academic tasks influences their ability to perform the task at hand at a more acceptable level (Broadbent, 2017; Hayat et al., 2020; Kang & Kim, 2017). The researcher noted the respondents oftentimes believe that they can learn even the most challenging mathematics works. This belief can help students have better academic performance in mathematics (Broadbent, 2017; Nasir & Iqbal, 2019).

Understanding Mathematics Classroom Instruction

For the level of understanding mathematics classroom instruction, the result showed that the overall mean rating is very high. The very high result is due to the very high rating of students for almost all items in the variable. This means that measures of understanding mathematics classroom instruction are always observed. This is coherent with the proposition of Olsson et. al. (2020) and Berkowitz et al. (2017) that students' perception of their class plays an essential role in their goals, motivation, engagement, and achievement in class.

Notably, the item with the highest mean described as very high pertains to the perception of students on their teacher's asking of questions to make sure that they are following along with the discussion. This is following the statement of Shanmugavelu et al. (2020) that proper questioning techniques in class are essential to delivering the lesson effectively. This is beneficial to both the teachers and the students, for this will enhance the quality of teaching output of teachers and increase the motivation and critical thinking of students.

The second highest mean for the item pertains to how students perceived their teacher to explaining in different ways to make sure that they understand their topics in mathematics. This is expected from good teachers since how teachers do and act in the classroom affects the students (Baafi, 2020; Olsson et. al. (2020), especially in lesson delivery in mathematics. Students tend to incline toward teachers when they perceive that their teacher is doing their best to help them understand their topics, especially when the topic is complex.

The third highest mean is for the item that pertains to how students were encouraged to correct their own mistakes in their mathematics class. This can be perceived as teachers teaching students to become independent and accountable for their learning (Berkowitz et al., 2017; Olsson et. al., 2020; Sun, 2021). When students are given a chance to correct their mistakes, their understanding of the concept becomes more concrete, just like in the concept of learning by doing. Through this, the students become more independent and involved in their studies.

Overall, the result on the perception of students of their mathematics classroom clearly shows their personal experiences and preferences. As noted from the results, only four out of 21 were rated as high; the rest of the items are very high; this shows how much they have positively perceived each item in their mathematics class.

Relationship between Teaching Styles of Teachers and Student Adjustment

The test of the relationship using the bivariate correlation analysis using Pearson product-moment correlation between the independent variable (teaching styles of teachers) and the dependent variable (student adjustment) reveals a positive and strong association between the two. This means that the teaching styles of teachers significantly predict student adjustment and lead to the rejection of the null hypothesis.

This result conforms to the results of Martin (2019) and Sikhwari et. al. (2019), where the teaching styles of teachers show a significant effect on student adjustment. Teaching styles implored by teachers affect students' adjustment, including their performance, engagement, and achievement.

Notably, several studies (Febriantina et. al., 2019; Msaedeh, 2019; Putra et. al., 2018; Pizon & Ytoc, 2021; Wilson et. al., 2019) has emphasized that teaching styles that make students the center of the learning process is more effective in engaging students in class and thus making them more adjusted compare to having students as dormant recipient of the lesson. This clearly puts importance on active teaching styles compared to traditional teaching styles.

Additionally, Stringer (2018) emphasized that the more students feel comfortable in their academic surroundings, the more they can engage themselves. This leads to better relationships inside the classroom for students and teachers. This will help teachers to better understand their students' varying interests and inclinations, and this can help them adjust their teaching styles to help students adjust more in class (Darling-Hammond et al., 2020; Esmail Sabra et al., 2018;

Immordino-Yang et al., 2019). Additionally, the teachers' concern toward the students is always observed in their mathematics class.

Relationship between Teaching Styles of Teachers and Understanding Mathematics Classroom Instruction

The test of the relationship between teaching styles of teachers and understanding mathematics classroom instruction shows that there is a positive and significant relationship between teaching styles and student perception, thus leading to the rejection of the null hypothesis.

The result conforms to the study of Chetty et al. (2019) that teaching styles influence student perception. Student perception in class can be influenced by teachers' actions and style of delivering lessons by emphasizing what they want the students to be in a particular class. Additionally, authors (Baafi, 2020) stresses the effect of teachers' teaching styles on students. In the results, teaching characteristics and classroom management had the highest correlation coefficient.

Furthermore, different aspects of instruction influence the perception of students in a class (Paul & Hlanganipai, 2017; Schenke et. al., 2018; Mellieon & Robinson, 2021). It is vital that teachers utilize teaching styles that can cause students to have a positive perception of the class and instruction because learning gets into the students if they have a positive perception of the class and instruction. Teaching characteristics and classroom management are very evident in the mathematics classroom of the respondents. The students were able to see the concern of their teacher in their learning, which led to better understanding in their mathematics classroom.

Relationship between Understanding Mathematics Classroom Instruction and Student Adjustment

The test of the relationship between understanding mathematics classroom instruction and student adjustment shows a significant positive relationship between indicators of student adjustment, thus leading to the rejection of the null hypothesis. This implies that the increase in understanding mathematics classroom instruction would also likely increase student adjustment.

This is similar to Mendoza (2019) and Birzina et. al. (2019), where the perception of students of classroom comfort impacts overall student adjustment. This also includes the finding of improving the experiences of students in the classroom as well as interactions with others. Teachers are expected to find ways to improve the classroom state to make students feel that they belong in their small community. This will ensure that students will feel the comfort and support of each class member to affect their adjustment. The results of the study negated the findings of Eghdami and Yousefi (2020).

The positive perception of students in their class helps them become adjusted academically and socially. Their perception of their ability to do school work helps them become academically adjusted, while their perceived ability to socialize with their peers helps them in their social adjustment. This also ensures that the students do not develop disruptive behaviors (Hazan Liran & Miller, 2019; Olivas, 2017). This follows that whenever students have a positive perception of their environment, the adjustment would also be positive. Just like in the results, students are mindful not to get into the wrong side of their teacher and classmates while in their mathematics class. This can be understood that their understanding of their mathematics classroom influenced how they treat others. This happens perhaps because the students realize that they can do better if they work together with their classmates (Roorda et. al., 2017).

Also, Coyle et. al. (2017) expressed that a significant positive relationship exists between students' perception and student adjustment, and the higher the perception of students on classroom order and organization, affiliation, and innovation relates to a more favorable adjustment (Mutlu & Yildirim, 2017; Thakur, 2020).

Mediating Effect of Understanding Mathematics Classroom Instruction on the Relationship between Teaching Styles of Teachers and Student Adjustment

The partial mediation could not totally claim that understanding mathematics classroom instruction is the very reason why the teaching styles of teachers can influence student adjustment. This indicates that understanding mathematics classroom instruction can partly explain how teachers' teaching styles can control student adjustment. However, the fact that teaching styles of teachers affect understanding mathematics classroom instruction and, in turn, affect student adjustment, the result is in line with the pronouncements of Jepsen et al. (2015), Schenke et. al. (2018), Coyle et. al. (2017), Sikhwari et. al (2019), Thakur (2020), Mutlu and Yildirim (2017) and Hazan Liran and Miller (2019). These past researches have helped to establish the foundation of this study. According to Allen (2017), in partial mediation, the independent variable affects the dependent variable with or without the mediating variable. Thus, in this study, teachers' teaching styles affect student adjustment with or without understanding mathematics classroom instruction. This makes the direct and the indirect path both significant.

V. CONCLUSION

The findings of this study confirm the assumption about the mediating effect of understanding mathematics classroom instruction on the relationship between teaching styles of teachers and student adjustment. Although understanding mathematics classroom instruction only has partial mediation, this means that not all can be explained by the mediator on the effect of teaching styles of teachers on student adjustment. Moreover, findings provide evidence that students acknowledge that the teaching styles of their teachers influence their adjustment. In effect, students recognize the teaching styles of their teachers most of the time, their perception of mathematics classroom instruction is very high, and their adjustment is high. It generally indicates a significant relationship between teaching styles of teachers, understanding of mathematics classroom instruction, and student adjustment. There is partial mediation on the effect of understanding

mathematics classroom instruction on the relationship between teaching styles of teachers and student adjustment.

Lastly, the findings supported the anchored proposition of Sikhwari et. al. (2019), the proposition of Jepsen et al. (2015), and the pronouncements of Coyle et. al. (2017). For this reason, understanding mathematics classroom instruction significantly mediates the teaching styles of teachers and student adjustment. The associations above discuss the relationship of the variables in the study. Therefore, the propositions are parallel in the present study since it deals with the mediating effect of understanding mathematics classroom instruction on the relationship between teaching styles of teachers and student adjustment.

VI. RECOMMENDATION

The study found a significant relationship between teaching styles of teachers, understanding of mathematics classroom instruction, and student adjustment. The researcher, therefore, recommends that policymakers, school administrators, and program heads establish programs that focus on the enhancement of the teaching styles of teachers to keep them updated so that the high level of perceived teaching styles by the students will even improve, especially in the teaching of the mathematics subject that will in effect help students to adjust more quickly in class. The study revealed that the teaching environment had the lowest mean among the indicators of teaching styles; the researcher, therefore, recommends that teachers utilize more group engaging activities in their classroom and plan the arrangement of students inside the class carefully. Furthermore, teachers are also advised to continue fostering their educational philosophy to maintain very high-level results from the students.

In terms of student adjustment, the study found a high level of academic efficacy among students. The researcher recommends that school administrators, program heads, and teachers strive harder in the delivery of the lesson and in making sure that their classrooms can promote positive belief for the students in their capacity to do well in a class, especially in mathematics subjects. For the students, the researcher recommends that they seek help from their teachers or peers if they are having difficulty learning a particular skill in mathematics. The students are reminded that asking for help is never a sign of weakness but instead a sign of true strength. Additionally, the program heads and teachers are recommended to maintain an approachable attitude so that students who are having difficulty in their academics can have the confidence to share their academic struggles.

The study found a very high level of understanding of mathematics classroom instruction. The researcher recommends that program heads and teachers continue to explain topics in mathematics that can accommodate all learners and continue to encourage them to keep on learning even though the subject matters get hard. Also, teachers are recommended to think of ways how they can keep the students' interest for the whole duration of the class. Based on the study results, students have noticed that their teacher in Mathematics does not use much group dynamics activity. Thus, teachers can utilize more of this to keep the interest throughout.

The mediation analysis suggests that the student adjustment is affected by the teaching styles of teachers through their understanding of the mathematics classroom instruction. Thus, the researcher recommends that future researchers explore more on this relationship more as there is still a 46.40 percent effect that could come from other variables not in the study.

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