Motivational Styles and Instructional Practices in Teaching Mathematics: Their Impact on Students' Learning

Catherine B. Pulumbarit
Bulacan State University, Malolos Bulacan Philippines
catherine.pulumbarit@bulsu.edu.ph

***Abstract*—The main concern of the study is to assess the impact of teachers' motivational style and instructional practices on students' learning in mathematics. this study has utilized descriptive correlational method of research and the primary data gathering tools instrument was lifted from an educational research project, the third international mathematics and science study - repeat also known as (timss-r) which was sponsored by the international association for the evaluation of education achievement or the so called (iea). the respondents of the study were the 3500 junior high school students and 33 teachers of marcelo h. del pilar national high school. results of the regression revealed that the motivational styles of teachers in terms of autonomy-supportive and controlling produced b coefficients of 2.827 and 2.997. the data could mean that the motivational styles of teachers can directly affect the learning of students in mathematics, which means the better the teachers' motivational style can yield higher students' learning in mathematics. the obtained f-value of .872 which was found non-significant at .05 alpha indicates that teachers' motivational styles did not form a very significant set of predictors for the students' learning. students with autonomy-supportive teachers, as compared with students in classrooms with controlling teachers, were more likely to stay in school. since motivational styles and instructional practices of teachers positively correlated with students' learning in mathematics, teachers may continuously motivate and utilize instructional practices that will further improve the achievement of students in mathematics.**

***Index Terms*—motivational styles, instructional practices, descriptive correlational method, coefficients**

I. Introduction

The present initiatives to improve mathematics education are built on the concept of transforming classrooms into student-centered communities in which learners engage in collaborative knowledge building [1]. Students are expected to develop a personal relationship with the subject, invest in their own and their classmates' learning, and engage in genuine inquiry in these classrooms. Mathematics teachers should serve as facilitators of learning, encourage student autonomy, provide opportunities for choice, and employ situations that motivate their conceptual knowledge of mathematics, according to the reform guidelines. [1]. In addition, these new dreams of homerooms and instructing apply as a lot offspring of neediness as they do to those in more rich schools.

The ideas of "rousing understudy learning" and "supporting understudy independence" that at present rule a large part of the talk on change practice resound well with a way of instructing that portray as independence supporting rather than controlling [2]. As per the creators, independence strong educators attempt to recognize and uphold understudies' inclinations and work around those individual interests to propel content obtaining. Interestingly, controlling instructors brief a specific way of acting and thinking, in order to wipe out unwanted practices.

These classes of educators' styles are specifically noteworthy. On one hand, writing on math guidance has given generous proof that in an enormous number of homerooms the nation over, math educators will generally utilize the sort of instructing that describes as controlling [3]. This peculiarity is much more principal in metropolitan schools [3]. For these instructors, then, at that point, the new showing jobs remain in complete differentiation with standards of training they esteem and to which they are acclimated. Then again, there is an apparently close match between the independence strong showing style and the style that is proposed by math change. Notwithstanding these likenesses, it is indistinct concerning whether and how the educators' decision of inspiration style in showing arithmetic might impact their execution of change based science educational program and guidance.

Independence strong instructors focused on sure understudies' characteristics. They asserted that by profiting by those characteristics, they would have liked to impact their science learning. These instructors stressed that their understudies' inventive thinking, capacity to issue settle, and "road smarts" were the assets they attempted to take advantage of and use in class. They additionally expressed that the understudies' experience encounters were important resources on which they attempted to assemble a homeroom culture that advanced higher request numerical reasoning. These

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instructors guaranteed that they attempted to profit by understudies' innate capacity and their own encounters to show them arithmetic and learning

They felt the change based educational plans could help them in setting up the study hall culture they expected to support by giving understudies real and energizing undertakings that requested innovative and decisive thinking on their part. From now on, the expectation of this review was to evaluate the inspiration styles and informative acts of educators in showing math and their effect on understudies learning.

A. Statement of the Problem

The main concern of the study is to assess the impact of teachers' motivational style and instructional practices on students' learning in mathematics. Specifically, this study sought answers to the following questions:

1. How may the motivational styles of teachers be described in terms of:
   1.1 autonomy-supportive; and
   1.2 controlling

2. To what extent do teachers' implement the following instructional practices:
   2.1 art of questioning;
   2.2 main topics addressed (fractions and number sense, measurement, geometry, proportionality, algebra, and data presentation, analysis and probability); and
   2.3 limits of instructional practices?

3. What is the level of students' learning in Mathematics?
4. Do the teachers' motivational styles and instructional practices significantly affect students' learning in Mathematics?
5. What pedagogical implications may be drawn from the findings of the study?

II. Methodology

The descriptive-correlational method of research was utilized in the study to determine the effects of teachers' motivational styles and instructional practices on students' learning in Mathematics. Correlational research systematically investigates the relationship among variables as well as in determining the cause-and-effect relationship. Quantitative research approach was utilized in this study in analyzing and understanding the effects of teachers' motivational styles and instructional practices on students' learning in Mathematics.

The study postulates that teachers' motivational styles and instructional practices do not significantly affect students' learning in Mathematics.

Fig. 1 showcases the conceptual paradigm of the study that was utilized in evaluating the effects of teachers' motivational styles and instructional practices significantly affect students' learning in Mathematics. Teachers' motivational styles were assessed in terms of their being autonomy-supportive and controlling educators.

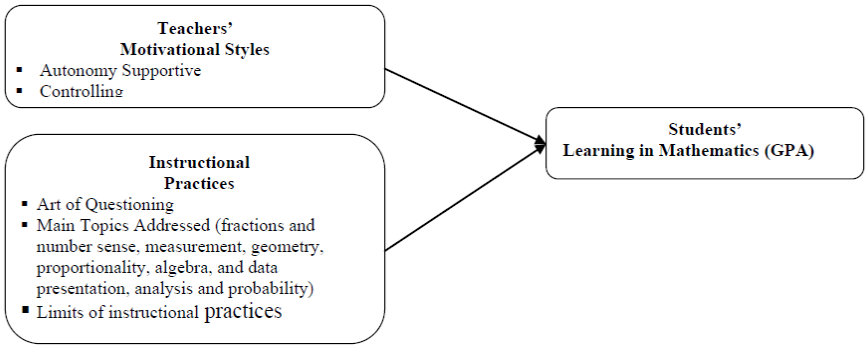

Figure 1. Conceptual model of the Study

Meanwhile, instructional practices were appraised in terms of teachers' art of questioning, main topics addressed, and limits of instructional practices. Main topics addressed are the following: art of questioning, fractions and number sense, measurement, geometry, proportionality, algebra, and data presentation, analysis, and probability. Student' learning was evaluated using students' general point average in Mathematics during the first semester of the school year 2019-2020.

A. Respondents of the Study

Correspondingly, the respondents of the study were the junior high school students and teachers of Marcelo H. Del Pilar National High School for school year 2019-2020. Table I shows the distribution of JHS teachers and students at Marcelo H. Del Pilar National High School.

TABLE I. Respondents of the Study

Respondents	Population and Sample Size	
	N	n
Teachers	33	33
Students	6500	3500
Total	**6533**	**3533**

B. Instrument of the Study

This study utilized standardized instrument on teachers' motivational styles and instructional practices. The instrument is reliable as evidenced by the Cronbach's alpha of 0.64 and 0.83. The substance of the

instrument on instructors' inspirational styles evaluated educators' independence steady and controlling styles [4].

Meanwhile, instructional practices were appraised in terms of teachers' art of questioning, main topics addressed, and limits of instructional practices. Main topics addressed are the following: art of questioning, fractions and number sense, measurement, geometry, proportionality, algebra, and data presentation, analysis, and probability.

The instrument was lifted from rOM an educational research project, the Third International Mathematics and Science Study - Repeat also known as (TIMSS-R) which was sponsored by the International Association for the Evaluation of Education Achievement or the so called (IEA). There are about 40 countries around the world that are being investigated by TIMSS-R is the fields of mathematics and science. TIMSS-R was designed to help improve the teaching and learning of both mathematics and science worldwide by measuring and interpreting differences in national education systems.

Student' learning was appraised using documentary analysis, in which students' general point average in Mathematics was documented during the first semester of the school year 2019-2020.

C. Data Gathering Procedure

The data gathering procedure was conducted thru the questionnaire method. The respondents were given individually a structured set of questions. The researcher carried out the following procedure in gathering the data:

1. A letter was sent to the Division Superintendent of Malolos, Bulacan to ask permission in the conduct of proposed study.
2. With the approval of the Division Superintendent, the researcher personally distributed the questionnaire to the respondents.
3. The questionnaires are gathered by the researcher from the respondents and have
4. been checked whether all the questions are answered.

D. Data Processing and Statistical Treatment

After gathering the data, tabulation was applied to the collected data and was processed using Statistical Packages for Social Sciences also known as (SPSS). The following statistical measures were used in order to analyze and interpret the data gathered:

- The teachers' motivational styles and instructional practices were quantified using the following scale

Rating Scale	Range	Descriptive Evaluation
5	4.50-5.00	Very great extent
4	3.50-4.49	Great extent
3	2.50-3.49	Moderate extent
2	1.50-2.49	Least extent
1	1.00-1.49	Not at all

- Students' learning or general point average in Mathematics was analyzed using frequency counts.
- The effects of teacher' motivational styles and instructional practices on students' learning was quantified using correlation and regression analysis.

III. Result and Discussion

A. Motivational Styles of Teachers

The thoughts of "persuading understudy learning" and "supporting understudy independence" that at present overwhelm a large part of the talk on change practice resound well with a way of instructing that describe as independence supporting rather than controlling [5], [6]. As indicated by the creators, independence strong educators attempt to distinguish and uphold understudies' inclinations and work around those individual interests to inspire content procurement. Interestingly, controlling instructors brief a specific way of acting and thinking, in order to dispose of bothersome practices.

These classes of educators' styles are quite compelling. On one hand, writing on math guidance has given considerable proof that in countless homerooms the nation over, science instructors will more often than not utilize the kind of instructing that portrays as controlling [7]. This peculiarity is much more vital in metropolitan schools. For these instructors, then, at that point, the new showing jobs remain in complete difference with standards of training they esteem and to which they are acclimated. Then again, there is an apparently close match between the independence steady showing style and the style that is proposed by math change. Notwithstanding these likenesses, it is hazy with respect to whether and how the educators' decision of inspiration style might impact their execution of change based arithmetic educational plan and guidance. The persuasive styles of educators were assessed as far as independence steady and controlling practices.

It may be gleaned from the data in Table II and Table III that the teachers' motivational style in terms of autonomy-supportive (3.95) was to a great extent while their controlling (3.19) motivational style was only to a moderate extent.

Autonomy-supportive of motivational was manifested when teachers modified the lessons to accommodate student's needs; sensitive to students' attention span (4.52), changed the suggested pace of the lessons to make their lessons meaningful to students (4.0), encouraged and valued for group cognition (3.78), attempted to make the abstractions more explicit in class by asking questions (3.96), encouraged students to use various resources to further their investigations (4.26), provided children with a context for the new activities they assigned in class; spent time setting up the activity (3.87), asked students to reiterate what was done the day before (4.0), asked the students to help each other (4.09), repeated the question until someone volunteered an answer (4.35), deflected ownership of class or resources (3.65), relied on multiple methods and tools (even when it was not used effectively (3.39), and proceeded with a discussion of students' responses (3.57).

Meanwhile, Controlling motivational style of teacher was shown when activities were done but immediate closure was placed on them (3.43), limited discussion about students' finding or conflicting results (3.30), content and context of activities were changed (3.22), activities were done individually rather than in small groups (3.48), whole group discussions were avoided unless to voice a correct answer (3.13), stated at the beginning what answer they should expect to get (3.22), removed the materials from the desks (3.17), worksheets were used when managing innovative activities was difficult (3.87), demonstrated the correct procedure (3.87), referenced answers as "correct" and "incorrect" without explaining why (2.39), answered their own questions claimed ownership of the class (2.65), reminding students of consequences (2.83), and skipped activities that could create disorder in class (2.87).

For sure, the writing is intelligent of a summed up discernment that changing the states of schooling for offspring of neediness relies intensely upon the instructor and their attitude toward educating and inspiring youngsters. Notwithstanding this affirmation, less consideration in the exploration local area has been given to understanding those components, inside the educators' control, that work with scattering of change disapproved of practices in such set-chimes. Little has been composed on educator attributes that pervade the support and authorization of change based instructional method in metropolitan schools. This sort of examination is genuinely necessary. By distinguishing these individual qualities, the educators may be in a superior situation to characterize the milieu that upholds instructor development and improvement in metropolitan networks [2].

Surely, educators, paying little mind to their expert situation, vary in their way of instructing, manners by which they collaborate with understudies, and techniques they use to propel learning. Though a few instructors give understudies choices, others endeavor to direct understudy thinking by furnishing students with explicit rules for their own and scholarly practices in class [8] dissected the two unmistakable showing strategies considering the educators 'yearning to a specific inspirational style, marking them as "controlling" and "independence supporting."

The creators demonstrated that every one of these styles impacts understudies' scholarly presentation in an unmistakable way, recommending that independence strong study halls will quite often sustain understudies that show more prominent scholastic accomplishment [9] further suggested that independence steady instructors will quite often be understudy focused, energize drive, give reasoning to exercises, support ability, advance an esteeming of errand, and depend on a noncontrolling correspondence style. To be sure, research discoveries paint a strikingly sure picture of understudy accomplishment within the sight of an independence steady way of instructing. For example, [10] found that understudies in study halls with independence strong educators, as contrasted and understudies in homerooms with controlling instructors, were bound to remain in school. Others observed that these understudies will generally show upgraded imagination [11], more prominent theoretical comprehension of the topic [12], higher scholastic inborn inspiration and better and higher scholarly execution [13].

TABLE II. TEACHERS' MOTIVATIONAL STYLE IN TERMS OF AUTONOMY SUPPORTIVE

Indicators	Mean	Interpretation
Modified the lessons to accommodate student's needs; sensitive to students' attention span.	4.52	Very Great Extent
Changed the suggested pace of the lessons to make their lessons meaningful to students (extended the activities; spent more time on computers; spent longer time on whole class discussions; extended homework)	4.00	Great Extent
Encouraged and valued for group cognition (Why don't you talk to Jaime?)	3.78	Great Extent
Attempted to make the abstractions more explicit in class by asking questions.	3.96	Great Extent
Encouraged students to use various resources to further their investigations (books, journal, Internet)	4.26	Great Extent
Provided children with a context for the new activities they assigned in class; spent time setting up the activity	3.87	Great Extent
Asked students to reiterate what was done the day before	4.00	Great Extent
Asked the students to help each other (can you explain it a different way? I think your explanation needs to be heard)	4.09	Great Extent
Repeated the question until someone volunteered an answer	4.35	Great Extent
Deflected ownership of class or resources (this is a time for you to learn; this is your class	3.65	Great Extent
Relied on multiple methods and tools (even when it was not used effectively	3.39	Moderate
Proceeded with a discussion of students' responses (even when they were not particularly sophisticated)	3.57	Great Extent
Average	**3.95**	**Great Extent**

TABLE III. TEACHERS' MOTIVATIONAL STYLE IN TERMS OF CONTROLLING

Indicators	Mean	Interpretation
Activities were done but immediate closure was placed on them	3.43	Moderate
Limited discussion about students' finding or conflicting results	3.30	Moderate
Content and context of activities were changed (computers were not used; group discussions were eliminated)	3.22	Moderate
Activities were done individually rather than in small groups	3.48	Moderate
Whole group discussions were avoided unless to voice a correct answer	3.13	Moderate

Stated at the beginning what answer they should expect to get	3.22	Moderate
Removed the materials from the desks	3.17	Moderate
Worksheets were used when managing innovative activities was difficult	3.87	Great Extent
Demonstrated the correct procedure	3.87	Great Extent
Referenced answers as "correct" and "incorrect" without explaining why	2.39	Least Extent
Answered their own questions claimed ownership of the class (you do not behave this way in my class)	2.65	Moderate
Reminding students of consequences (you will only hurt yourself; you cannot pass the test)	2.83	Moderate
Preventive (skipped activities that could create disorder in class)	2.87	Moderate
Average	**3.19**	**Moderate**

B. Implementation of Teachers' Instructional Practices

The study of effective teaching has a long history in the educational research community [14]. With an eye on student achievement, researches have attempted to identify particular teacher actions that contribute to increased student success in academic subjects [15]. To this end, a considerable body of literature within the past two decades has focused on the study of teachers' instructional practices and the effect of each style on learners and their academic success [16].

Perusal of data in Tables IV to XI would reveal that the implementation of teachers' instructional practices was to a great extent in terms of art of questioning (3.78), fractions and number sense (4.14), measurement (4.27), geometry (4.27), proportionality (4.15), algebra (4.36), and data presentation, analysis, and probability (4.14) while the limits of instructional practices was only to a moderate extent (3.47).

In Table IV, the teachers' art of questioning was evident when they explain the reasoning behind an idea (4.52), represent and analyze relationships using tables, charts, or graphs (4.22), work on problems for which there is no immediately obvious method of solution (3.70), use computers to solve exercise or problems (3.04), write equations to represent relationships (4.09), practice computational skills (4.17), and use graphing calculators to solve exercises or problems (2.74).

The data in Table V revealed great extent of instructional practices in terms of fractions and number sense. This was manifested by the inclusion of whole number – including place values, factorization and operations (4.26), understanding and representing common fractions (4.26), computations with common fractions (4.35), understanding and representing decimal fractions (4.13), computations with decimal fractions (3.96), relationships between common and decimal fractions, ordering of fractions (3.87), rounding whole number and decimal fractions (4.13), estimating the results of computations (4.09), number lines (4.17), computations with percentages and problems involving percentages (3.96), simple computations with negative numbers (4.17), and square roots (4.35).

TABLE IV. INSTRUCTIONAL PRACTICES OF TEACHERS IN TERMS OF ART OF QUESTIONING

Indicators	**Mean**	**Interpretation**
Explain the reasoning behind an idea	4.52	Very Great Extent
Represent and analyze relationships using tables, charts, or graphs.	4.22	Great Extent
Work on prob. for w/c there is no immediately obvious method of sol	3.70	Great Extent
Use computers to solve exercise or problems	3.04	Moderate
Write equations to represent relationships	4.09	Great Extent
Practice computational skills	4.17	Great Extent
Use graphing calculators to solve exercises or problems	2.74	Moderate
Average	**3.78**	**Great Extent**

TABLE V. INSTRUCTIONAL PRACTICES OF TEACHERS IN TERMS OF FRACTIONS AND NUMBER SENSE

Indicators	**Mean**	**Interpretation**
Whole number – including place values, factorization and operations	4.26	Great Extent
Understanding and representing common fractions.	4.26	Great Extent
Computations with common fractions	4.35	Great Extent
Understanding and representing decimal fractions	4.13	Great Extent
Computations with decimal fractions	3.96	Great Extent
Relationships between common and decimal fractions, ordering of fractions	3.87	Great Extent
Rounding whole number and decimal fractions	4.13	Great Extent
Estimating the results of computations	4.09	Great Extent
Number lines	4.17	Great Extent
Computations with percentages and problems involving percentages	3.96	Great Extent
Simple computations with negative numbers	4.17	Great Extent
Square roots (of perfect squares less than 144), small integer exponents	4.35	Great Extent
Average	**4.14**	**Great Extent**

In addition, it may be perused in Table VI that the instructional practices of teachers in terms of measurement was shown by the inclusion of the following topics namely Units of measurement; standard metric units (4.26), reading measurement instruments (4.17), estimates of measurement; accuracy of measurement (4.22), perimeter and area of simple shapes – triangle, rectangles, and circles (4.43), perimeter and area of combined shapes (4.30), and Volume of rectangular solids (4.22).

TABLE VI. INSTRUCTIONAL PRACTICES OF TEACHERS IN TERMS OF MEASUREMENT

Indicators	Mean	Interpretation
Units of measurement; standard metric units	4.26	Great Extent
Reading measurement instruments	4.17	Great Extent
Estimates of measurement; accuracy of measurement	4.22	Great Extent
Perimeter and area of simple shapes – triangle, rectangles, and circles	4.43	Great Extent
Perimeter and area of combined shapes	4.30	Great Extent
Volume of rectangular solids – i.e., Volume=length, width, height	4.22	Great Extent
Average	**4.27**	**Great Extent**

Meanwhile, instructional practices of teachers in terms of geometry were exemplified by the inclusion of Cartesian coordinates of points in a plane (4.43), coordinates of points on a given straight line (4.39), simple two-dimensional geometry – angles on a straight line, parallel lines, triangles and quadrilaterals (4.30), congruence and similarity (4.26), symmetry and transformations (4.09), and visualization of three-dimensional shapes (4.13). (Table VII)

TABLE VII. INSTRUCTIONAL PRACTICES OF TEACHERS IN TERMS OF GEOMETRY

Indicators	Mean	Interpretation
Cartesian coordinates of points in a plane	4.43	Great Extent
Coordinates of points on a given straight line	4.39	Great Extent
Simple two-dimensional geometry – angles on a straight line, parallel lines, triangles and quadrilaterals	4.30	Great Extent
Congruence and similarity	4.26	Great Extent
Symmetry and transformations (reflection and rotation	4.09	Great Extent
Visualization of three-dimensional shapes	4.13	Great Extent
Average	**4.27**	**Great Extent**

TABLE VIII. INSTRUCTIONAL PRACTICES OF TEACHERS IN TERMS OF PROPORTIONALITY

Indicators	Mean	Interpretation
Scales applied to maps and models	4.04	Great Extent
Concepts of ratio and proportions; ratio and proportion problems	4.26	Great Extent
Average	**4.15**	**Great Extent**

The data in Table VIII revealed that in terms of proportionality, scales applied to maps and models (4.04) and concepts of ratio and proportions (4.26) were made part of the teachers' instructional practices.

TABLE IX. INSTRUCTIONAL PRACTICES OF TEACHERS IN TERMS OF ALGEBRA

Indicators	Mean	Interpretation
Number patterns and simple relations	4.30	Great Extent
Simple algebraic expressions	4.35	Great Extent
Representing situations algebraically; formulas	4.43	Great Extent
Solving simple equations	4.52	Very Great Extent
Solving simple inequalities	4.22	Great Extent
Average	**4.36**	**Great Extent**

In terms of algebra (Table IX), the following concepts were likewise made part of teachers' instructional practices namely number patterns and simple relations (4.30), simple algebraic expressions (4.35), representing situations algebraically (4.43), solving simple equations (4.52), and solving simple inequalities (4.22).

TABLE X. INSTRUCTIONAL PRACTICES OF TEACHERS IN TERMS OF DATA PRESENTATION, ANALYSIS AND PROBABILITY

Indicators	Mean	Interpretation
Representation and interpretation of data in graphs, charts and tables	4.17	Great Extent
Arithmetic mean	4.26	Great Extent
Simple probabilities – understanding and calculations	4.00	Great Extent
Average	**4.14**	**Great Extent**

In Table X, great extent of instructional practices was recorded in terms of data presentation, analysis, and probability. This was manifested by the inclusion of representation and interpretation of data in graphs, charts and tables (4.17), arithmetic mean (4.26), and simple probabilities (4.00).

Finally, the limits of instructional practices were shown when students with different academic abilities (3.70), students who come from a wide range of backgrounds (3.48), students with special needs (3.48), uninterested students (3.52), disruptive students (3.43), parents' interest in their children's learning and progress (3.22), shortage of computer hardware (3.39), and shortage of computer software (3.39). (Table XI)

C. Level of Students' Learning in Mathematics

Considered academic behaviour or the learner's perceived belief to succeed in completing a given instructional task as one of the most essential internal variables related to academic achievement [17]. Such that according to those who are high in academic self-efficacy had better grades. In addition, indicated the affective components of self-efficacy which explains the students' emotional reactions to tasks such as feelings of anger, hopelessness, boredom or shame, to feelings of enjoyment, relief, pride and hope; these feelings can influence their self-regulation, learning strategies, motivation, and academic achievements.

The level of academic learning of students in Mathematics was appraised in terms of their written achievement, performance, and quarterly assessment.

It may be gleaned from Table XII that in terms of written work, nine students recorded a very satisfactory to outstanding ratings (85%-100%), about 6 students have achieved fairly satisfactory to satisfactory (75%-84%), while eight students failed to meet the expectation with a rating of below 75 percent.

In terms of performance dimension, 13 students documented a very satisfactory to outstanding ratings (85%-100%), only two students have achieved fairly satisfactory to satisfactory (75%-84%), while eight students failed to meet the expectation with a rating of below 75 percent.

Finally, during the quarterly assessment, three students documented a very satisfactory to outstanding ratings (85%-100%), five students have achieved fairly satisfactory to satisfactory (75%-84%), while 15 students failed to meet the expectation with a rating of below 75 percent.

This means that students from Marcelo H. del Pilar National High School cannot cope with the demands and difficulty of Mathematics subject. The teachers may look into the factors affecting their low performances so that appropriate remediation may be done at once.

TABLE XI. INSTRUCTIONAL PRACTICES OF TEACHERS IN TERMS OF LIMITS OF INSTRUCTIONAL PRACTICES

Indicators	**Mean**	**Indicators**
Students with different academic abilities	3.70	Great Extent
Students who come from a wide range of backgrounds, (e.g., economic, language)	3.48	Moderate
Students with special needs, (e.g., hearing, vision, speech impairment, physical disabilities, mental or emotional/psychological impairment	3.48	Moderate
Uninterested students	3.52	Great Extent
Disruptive students	3.43	Moderate
Parents interested in their children's learning and progress	3.65	Great Extent
Parents uninterested in their children's learning and progress	3.22	Moderate
Shortage of computer hardware	3.39	Moderate
Shortage of computer software	3.39	Moderate
Average	**3.47**	**Moderate**

TABLE XII. LEVEL OF ACADEMIC LEARNING OF STUDENTS

Academic Performance	**Written Work**	**Performance**	**Quarterly Assessment**
90 – 100 (Outstanding)	5	6	1
85 – 89 (Very Satisfactory)	4	7	2
80 – 84 (Satisfactory)	3	1	2
75 – 79 (Fairly Satisfactory)	3	1	3
Below 75 (Did not meet Expectation)	8	8	15
Total	**23**	**23**	**23**

TABLE XIII. REGRESSION ANALYSIS OF TEACHERS' MOTIVATIONAL STYLES ON STUDENT'S ACADEMIC PERFORMANCE

Variables	**Unstandardized Coefficients**		**Standardized Coefficients**		
	B	**Std. Error**	**Beta**	**t**	**Sig.**
(Constant)	84.584	10.038		8.426	0
Autonomy Supportive	2.827	2.666	0.255	1.06	0.302
Controlling	2.997	2.535	0.284	1.182	0.251
R-squared = .080					
F-value = .872					
p-value = .433					
alpha = 0.05					

D. Influence of Teachers' Motivational Styles and Instructional Practices on Students' Learning in Mathematics

Inideally, it was hypothesized that teachers' motivational styles and instructional practices do not significantly influence students' learning in Mathematics. To determine the extent of influence of teachers' motivational styles and instructional practices on students' learning in Mathematics, the data were subjected to regression analysis and presented in Table XIII and Table XIV.

E. Teachers' Motivational Styles and Students' Learning in Mathematics

Results of the regression in Table XIII revealed that the motivational styles of teachers in terms of autonomy-supportive and controlling produced B coefficients of 2.827 and 2.997. The data could mean that the motivational styles of teachers can directly affect the learning of students in Mathematics, which means the better the teachers' motivational style can yield higher students' learning in Mathematics. Since the probability values (0.302 and 0.251) were found greater than the set

alpha at 0.05, the influence cannot be considered significant.

The obtained F-value of 0.872 which was found non-significant at 0.05 alpha indicates that teachers' motivational styles did not form a very significant set of predictors for the students' learning in Mathematics at Marcelo H. del Pilar National High School. Hence, the null hypothesis was accepted.

Teachers' instructional practices and students' learning in Mathematics. Results of the regression in Table XIV revealed that the instructional practices of teachers in terms of art of questioning, fractions and number sense, measurement, geometry, proportionality, algebra, data presentation analysis and probability, as well as limits of instructional practices produced B coefficients of 2.761, 2.009, 4.672, 4.281, 1.399, 3.321, 3.81, and 0.34. The data could mean that the instructional practices of teachers can directly affect the learning of students in Mathematics, which means the better the instructional practices can yield higher students' learning in Mathematics. Since the probability values of 0.486, 0.623, 0.513, 0.314, 0.796, 0.491, 0.321, and 0.918 were found greater than the set alpha at 0.05, the influence cannot be considered significant.

The obtained F-value of 0.326 which was found non-significant at 0.05 alpha indicates that teachers' instructional practices did not form a very significant set of predictors for the students' learning in Mathematics at Marcelo H. del Pilar National High School. Hence, the null hypothesis was accepted.

F. Pedagogical Implications Drawn from the Findings of the Study

The following pedagogical implications were drawn from the findings of the study:

Routes to renewing mathematics instruction are blocked by several factors, including the bureaucratic structure of urban schools, the disabling conditions of the workplace, lack of motivation and context for engagement in mathematics learning on the part of students, and lack of resources and quality teachers.

Autonomy-supportive teachers tend to be student-centered, encourage initiative, provide rationale for activities, nurture competence, promote a valuing of task, and rely on a noncontrolling communication style.

Students in classrooms with autonomy-supportive teachers, as compared with students in classrooms with controlling teachers, were more likely to stay in school.

Success in life can be attributed to academic achievement which is one of its many determinants of hence may be given attention especially for those students with low-recorded math achievement.

TABLE XIV. REGRESSION ANALYSIS OF INSTRUCTIONAL PRACTICES OF TEACHERS ON STUDENT'S ACADEMIC PERFORMANCE

TABLE XV. VARIABLES	**Unstandardized Coefficients**		**Standardized Coefficients**		
	B	**Std. Error**	**Beta**	**t**	**Sig.**
(Constant)	75.204	17.597		4.274	0.001
Art of Questioning	2.761	3.851	0.249	0.717	0.486
Fractions and Number Sense	2.009	3.991	0.246	0.503	0.623
Measurement	4.672	6.949	0.505	0.672	0.513
Geometry	4.281	4.085	0.532	1.048	0.314
Proportionality	1.399	5.292	0.168	0.264	0.796
Algebra	3.321	4.684	0.388	0.709	0.491
Data presentation, Analysis, and Probability	3.81	3.695	0.551	1.031	0.321
Limits of Instructional Practices	0.34	3.24	0.03	0.105	0.918
R-squared = 0.167					
F-value = 0.326					
p-value = 0.941					
alpha = 0.05					

IV. CONCLUSION

In view of the findings of the study, the foregoing conclusions were drawn:

1. Teachers regardless of their professional circumstance, differ in their style of teaching, ways in which they interact with students, and methods they use to motivate learning.

2. It may be safely concluded that the instructional practices of teachers at Marcelo H. del Pilar National High School in terms of subject contents are aligned with the minimum requirements of the Department of Education.

3. The students from Marcelo H. del Pilar National High School cannot cope with the demands and difficulty of Mathematics subject. The teachers may look into the factors affecting their low performances so that appropriate remediation may be done at once.

4. The null hypothesis that teachers' motivational styles and instructional practices do not significantly affect students' learning in Mathematics was accepted.

5. Implications drawn from the findings of the study could be considered and may be inputted in further improving the learning of students in Mathematics.

V. RECOMMENDATIONS

Utilizing the findings and conclusions as bases, the study have the following recommendations:

1. That teacher at Marcelo H. del Pilar National High School continue to utilize varied motivational styles in educating the students on Mathematical practices.

2. Varied instructional practices of teachers can still be improved from great extent to a very great extent of utilization.

3. It is therefore exigent that teachers and school principals develop a program to remedy the current low achievement of students in Mathematics.

4. Since motivational styles and instructional practices of teachers positively correlated with students' learning in Mathematics, teachers may continuously motivate and utilize instructional practices that will further improve the achievement of students in Mathematics.

Conflict of Interest

The author declares no conflict of interest.

Author Contributions

This research is a SOLE AUTHOR and all contents are the author's data and work.

References

[1] Executive Summary. [Online]. Available: https://www.nctm.org/uploadedFiles/Standards_and_Positions/PSSM_ExecutiveSummary.pdf

[2] B. Hollenbeck and Q. Shi, "Developing effective and sustainable distance education programs and courses," *Int. J. Inf. Educ. Technol.*, vol. 11, no. 2, 2021.

[3] A. Ahrens, J. Zaščerinska, C. Lange, and L. Aļekseje, "A comparative analysis of processes of conceptual change for the enhancement of implementation of green energy education and training," *Int. J. Inf. Educ. Technol.*, vol. 11, no. 1, 2021.

[4] L. W. Siew, L. W. Hoe, L. K. Fai, M. A. Bakar, and S. J. Xian, "Analysis on the e - Learning method in Malaysia with AHP - VIKOR model," *Int. J. Inf. Educ. Technol.*, vol. 11, no. 2, 2021.

[5] L. L. Lacatan, "Hybrid method and face to face method in teaching mathematics : Effects on students' performance," *International Journal of Information and Education Technology*, vol. 3, no. 2, pp. 143–146, 2013.

[6] L. Lacatan, "Success of hybrid method to an e-community of learners in cyberspace," *Proc. Appl. Int. Bus. Conf. 2008 SHORT-TERM*, pp. 381–384, 2008.

[7] J. N. Mindoro, N. U. Pilueta, Y. D. Austria, L. L. Lacatan, and R. M. Dellosa, "Capturing students' attention through visible behavior: A prediction utilizing YOLOv3 approach," in *Proc. 11th IEEE Control Syst. Grad. Res. Colloquium, ICSGRC 2020 - Proc.*, no. August, pp. 328–333, 2020.

[8] G. D. Bailey and B. Dams, "School is for teachers : Enhancing the school," *NASSP Bull.*, pp. 44–48, 1989.

[9] S. Abramovich, A. Z. Grinshpan, and D. L. Milligan, "Teaching mathematics through concept motivation and action learning," *Educ. Res. Int.*, vol. 2019, pp. 1–13, 2019.

[10] J. M. C. Jr and R. A. O. Cruz, "Understanding of learning styles and teaching strategies towards improving the teaching and learning of mathematics," *LUMAT Gen.*, vol. 8, pp. 19–43, 2020.

[11] M. Pantziara and G. Philippou, "Students' motivation in the mathematics classroom. Revealing causes and consequences," *Int. J. Sci. Math. Educ.*, pp. S385–S411, 2014.

[12] M. Pantziara and K. Waege, "Students' motivation and teachers' practices in," *Proc. Eighth Congr. Eur. Soc. Res. Math. Educ.*, no. 1, pp. 1–10, 2013.

[13] L. Bouzid. (2020). DigitalCommons @ University of Nebraska - Lincoln Secondary Mathematics Teachers' and Students ' Approaches to Engagement and Motivation for Mathematics Learning in the Classroom. *Honor. Theses, Univ. NebraskaLincoln*. [Online]. Available: https://digitalcommons.unl.edu/cgi/viewcontent.cgi?article=1248&context=honorstheses

[14] A. Moreno-guerrero, I. Aznar-Diaz, C. Reche-Caceres, Pilar, and S. Alonso-Garcia, "E-Learning in the teaching of mathematics: An educational experience in adult high school," *MDPI*, 2020.

[15] G. Sriharee, "The design patterns for language learning and the assessment on game-based learning," *Int. J. Inf. Educ. Technol.*, vol. 10, no. 2, pp. 95–103, 2020.

[16] K. S. Na, S. Petsangsri, and Z. Tasir, "The relationship between academic performance and motivation level in e-learning among thailand university students," *Int. J. Inf. Educ. Technol.*, vol. 10, no. 3, pp. 181–185, 2020.

[17] S. J. R. Manglapuz and L. L. Lacatan, "Academic management android application for student performance analytics: A comprehensive evaluation using ISO 25010:2011," *Int. J. Innov. Technol. Explor. Eng.*, vol. 8, no. 12, pp. 5085–5089, 2019.

Catherine B. Pulumbarit is a graduate of BS Electronics and Communication Engineering (BSECE) and Master in Industrial Technology Management (MITM) at Bulacan State University and Master of Arts in Education major in Mathematics (MAEd – Math) at La Consolacion University Philippines. Currently she is the Immersion Coordinator for Academic Strand at Marcelo H. Del Pilar National High School, holds the position of Instructor III at Bulacan State University-Hagonoy Campus. Also, she is a License Professional Teacher major in Mathematics.