

PREDICTIVE EFFICACY OF STUDENT AND TEACHER RELATED FACTORS ON STUDENTS' MATHEMATICS LEARNING

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ABSTRACT: *The study was conducted to examine the potential factors influencing the academic performance of Grade 11 STEM students in University of Science and Technology of Southern Philippines. The respondents for this study were two hundred sixty four (264) 11th grade students. A survey was conducted by using Likert Scale for information gathering about the potential factors relating to academic performance of students. The academic performance was gauged by the result of their midterm grade. Mean and Standard Deviation were applied in determining the extent of students and teacher related factors and the level of academic performance of the students' achievement. Multiple regressions were used to test the significance of the relationship of the variables. The results of the study revealed that the student-related factors in terms of interest in mathematics and study habits do not significantly predict the students' mathematics performance. The same thing goes with the teacher-related factors includes personality traits, teaching skills and instructional materials.*

Key Words: Predictive Efficacy, Potential Factors, Mathematics Learning

1. INTRODUCTION

Students are considered as the most essential asset for any educational institute and of a country. Hence, the social and economic development of the country is directly linked with student academic performance. The students' performance plays an important role in producing the best quality graduates who will become great leader and manpower for the country and responsible for the country's economic and social development [1]. Thus, in our march towards scientific and technology advancement, we need nothing but a good performance in mathematics at all levels of schooling [2].

Mathematics is a different subject in comparison to other subject areas. Its objective employs specific procedures, involves symbols and intricate formula, and it has a vocabulary of its own. It is a very sequential subject, this means that student's previous learning or stocked knowledge is necessary in enhancing their learning of new topic given. The principles and theories learned in the different concepts could be utilized in higher Mathematics such as the good foundation in the topics is very essential [3]. However, students' difficulty in Mathematics across countries all over the world is prevalent. This difficulty results to a poor performance of the subject and inability to pursue higher Mathematics courses. The fear of failure in the subject and low self-esteem has caused students to become so afraid that their ability in solving problems and applying mathematical concepts is affected [4].

Many factors contribute to academic performance of the students' in Mathematics, study habits are believed to be one of the influential factors in the learning process. This means that attitude and conduct of the students towards their studies would greatly affect the academic achievement. Without good study habits, success in the endeavor will be impossible to fulfill [5]. Another factor is the teachers' factor. The Department of Education (DepEd) is committed in providing schools with teachers who are able to help students develop their abilities, skills and attitude for them to function effectively in an environment that is changing rapidly in many different ways [6]. Teachers are encouraged to established and nurture a classroom climate where students collaborate and will feel comfortable in discussing their ideas, strategies, and solution (NCTM, 2004). It has been proven that teachers have an important influence on students' academic

achievement. They play a crucial role in educational attainment because the teacher is ultimately responsible for translating policy into action and principles based on practice during interaction with the students [7]. Others [8] have concluded from their study that the most important factor influencing student learning is the teacher. Teachers stand in the interface of the transmission of knowledge, values and skills in the learning process. If the teacher is ineffective, students under the teacher's tutelage will achieve inadequate progress academically. This is regardless of how similar or different the students are in terms of individual potential in academic achievement.

The University of Science and Technology of Southern Philippines (USTSP), particularly on the Senior High School Program Grade 11 STEM students, there also exists such problem to students' academic performance. However, students' academic performance may be attributed to the two important factors which are the student-related and teacher-related factors. It is in this situation that the researchers will purposely undertake this study.

2. METHODOLOGY

2.1 Research Design

The factors affecting mathematics learning of Grade 11 STEM students' of USTP was determined in this study. A descriptive correlational research design was used for this study to examine the relationship of students-related factors and teacher-related factors to their performance in Mathematics.

Descriptive research is designed for the investigator to gather information about the present existing condition [9]. Some one [10], defines descriptive research as involving collection of data in order to test hypothesis or to answer questions concerning the current status of the subject of the study. A descriptive study determines and report the way things are. The descriptive survey was used in gathering the data for analysis and interpretation.

The descriptive method fit into this study because the researcher searched for answers to some questions about the student perceptions on the two factors namely, the student-related factor in terms of interest and study habits, and the teacher-related factors in terms of personality traits, teaching skills and instructional materials, influencing the students' academic performance in mathematics. The likert

scale questionnaire is one of the classical techniques to collect descriptive data.

2.2 The Instruments

The data gathering instrument was patterned from [11]. The first part of the questionnaire dealt with students' personal information while the second part was on the extent of student-related factors with two components: interest and study habits. The third part was on the teacher-related factors with three components: personality traits, teaching skills and instructional materials used in teaching as perceived by the students'. These were given one set of five checkboxes each. The five checkboxes were as follows: 5 – Always, 4 – Often, 3 – Sometimes, 2 – Rarely, 1 – Never. The Mathematics grade of the student's was based on their midterm grade.

2.3 The Participants

The respondents of this study were composed of two hundred sixty four (264) Grade 11 Senior High school students belonging to STEM strand in USTP during the 1st Semester SY 2017-2018.

2.4 Data-Gathering Procedure

Letter requesting permission to conduct the research study was given to the principal of University of Science and Technology of Southern Philippines Senior High School Department . The questionnaire was distributed to the respondents after securing the permit. Copies of the approved letter were presented to the teachers in order to gather relevant data. The instruments were retrieved after they were finished answering.

Minitab was used after the data gathered has been checked,classified,tabulated and analyzed based from the research design mentioned. This was then prepared for final presentation to the experts of different fields of specialization.

3. RESULTS AND DISCUSSIONS

This section presents , analyzes and interprets the data gathered from the Senior High school students of University of Science and Technology of Southern Philippines in determining factors affecting Performance in Mathematics.

Table 1.Extent of Interest in Mathematics as Perceived by Students

Interest	Weighted Mean	Rank	Verbal Interpretation
1.I make myself prepared for the math subject.	3.64	3	Often
2.I listen attentively to the lecture of my teacher.	4.06	2	Often
3. I actively participate in the discussion, answering exercises and clarifying things I did not understand.	3.53	4	Often
4. I want to get a good grade on tests, quizzes, assignments and projects.	4.6	1	Always
5. I get frustrated when the discussion is interrupted or the teacher is absent.	3.19	5	Sometimes
Average Weighted Mean	3.80		Often

Table 1 [11]shows the weighted mean of students' interest in Mathematics. Students' level of interest in Mathematics was rated based on the students' self-perceived level of preparation for the Mathematics subject, attention given to

the teacher's lecture, active participation in class, their desire to get good grades and their desire to listen to discussions in class. The students gave a unifying perception on their level of interest in Mathematics. The item "I want to get a good grade on tests, quizzes, assignments and projects." ranked first with an average weighted mean of 4.6. The item "I get frustrated when the discussion is interrupted or the teacher is absent." got the lowest rating with an average weighted mean of 3.2. The overall weighted mean of interest in Mathematics is 3.80. This means students are "often" interested in the subject. By their responses one would be led to think that their interest in learning Mathematics subject has a great extent and tend to have higher grades.

Table 2. Extent of Study Habits as Perceived by the Students

Study Habits	Weighted Mean	Rank	Verbal Interpretation
1. I do my assignments regularly.	3.96	2	Often
2. I exert more effort when I do difficult assignments.	3.92	3	Often
3. I spend my vacant time in doing assignments or studying my lessons.	3.19	10	Sometimes
4. I study the lessons I missed if I was absent from the class.	3.46	7	Sometimes
5. I study and prepared for quizzes and tests.	3.90	4	Often
6. I study harder to improve my performance when I get low grades.	4.12	1	Often
7. I spend less time with my friends during school days to concentrate more on my studies.	3.24	10	Sometimes
8. I prefer finishing my studying and assignments first before watching ant television program.	3.31	8	Sometimes
9. I see to it that extracurricular activities do not hamper my studies.	3.58	5	Often
10. I have a specific place of study at home which I keep clean and orderly.	3.50	6	Often
Average Weighted Mean	3.62		Often

Table 2 [11] shows the list of ten (10) items about situation or action statements used in the data gathering and the corresponding weighted means of the students' responses ranked from the highest weighted mean together with the verbal interpretations. The criteria is obtaining students' level of study habits were based on their personal tendency or pattern of action in studying when they are at school.Overall, the extent of study habits as perceived by the students themselves gained an "often" result with an average weighted mean of 3.62. Among each situation or action statements or items given, the item "I study harder to improve my performance when I get low grades" ranked first with an average weighted mean of 4.12 but the item "I spend my vacant time in doing assignments or studying my lessons." got the lowest extent of study habits in Mathematics. This implies that students who have high regard to their study habits or have positive attitudes towards school activities, tend to have a higher grades.

Table 3. Extent of Personality Traits as Perceived by the Students

Personality Traits	Weighted Mean	Rank	Verbal Interpretation
1. Has a good relationship with the students and teachers.	4.60	1	Always
2. Shows smartness, confidence and firmness in making decisions.	4.58	2	Always
3. Imposes proper discipline and is not lenient in following the prescribed rules.	3.97	5	Often
4. Is open to suggestions and opinions and is worthy of praise.	4.07	3	Often
5. Encourage me to succeed.	4.06	4	Often
Average Weighted Mean	4.24		Often

Table 3 [11] shows the data on the extent of personality traits of the teachers with the computed weighted mean, and interpretation. Extent for teachers' personality traits were ranked based on their relationship with the students, their smartness, confidence and firmness in making decisions, the way they imposed proper disciplines and not lenient in following the prescribed rules, their personality with good sense of humor and their appreciation to suggestions or opinions with worthy of praises, and their encouragements.

The table reveals that item number 1 ranked first with an average weighted mean of 4.60 and interpreted as "always" which means that the teachers always has a good relationship with the students. The item number 4 ranked second with an average weighted mean of 4.07 also interpreted as "always" which means that the teacher is always open to suggestions and opinions and is worthy of praise. Items 5, 2, and 3 interpreted also as "often" with the weighted mean of 4.06, 4.05, and 3.97 respectively. This means that the role of the teacher in the learning process of the students is very important. They are ultimately responsible for translating educational policies and principles into actions.

Table 4 [11] presents the extent of teaching skills acquired by the teachers in Mathematics as perceived by the students. The overall weighted mean in terms of teaching skills is 3.99 interpreted as "often". It was observed that the item "The teacher has mastery of the subject matter." Has the highest average weighted mean which is 4.70 among the six items and interpreted as "always" followed by the item "The teacher explains the objectives of the lesson clearly at the start of each period." with an average weighted mean of 4.51 also interpreted as "always". Items "The teacher is organized in presenting subject matters by systematically following course outline.", "The teacher uses various strategies, teaching aids/devices and techniques in presenting the lesson.", "The teacher is updated with present trends, relevant to the subject

atter." and "The teacher gives me extra point for rewards". Interpreted also as "often" with an average mean of 4.13, 4.06, 3.95, 3.88 and 3.70 respectively. This means that the used of variety of teaching skills would greatly affect the academic performance of the students.

Table 4. Extent of Teaching Skills as Perceived by the Students

Teaching Skills	Weighted Mean	Rank	Verbal Interpretation
1. Explains the objectives of the lesson clearly at the start of each period.	4.51	2	Always
2. Has mastery of the subject matter.	4.70	1	Always
3. Is organized in presenting subject matters by systematically following course outline.	4.13	3	Often
4. Uses various strategies, teaching aids/devices and techniques in presenting the lesson.	4.06	4	Often
5. Gives me extra point for rewards.	3.70	6	Often
6. Is updated with present trends, relevant to the subject matter.	3.88	5	Often
Average Weighted Mean	3.66		Often

Table 5. Extent of Instructional Materials used by the Mathematics Teachers

Instructional Materials	Weighted Mean	Rank	Verbal Interpretation
1. Chalk and board in explaining the lessons	4.27	1	Often
2. Workbooks/textbooks	3.99	2	Often
3. PowerPoint Presentations	2.99	5	Sometimes
4. Online Resources	3.20	3	Sometimes
5. Graphing Softwares	3.09	4	Sometimes
Average Weighted Mean	3.51		Often

Table 5 [11] presents the extent of instructional materials used by the teachers in Mathematics. It shows that "The teacher used chalk and board in explaining the lessons." interpreted as "often" with an average weighted mean of 4.27 ranked 1. "The teacher used workbooks/textbooks." ranked 2 which was interpreted as "often" with an average weighted mean of 3.99. The items "The teacher used online resources" and "The teacher uses graphing softwares." interpreted as "sometimes" with an average weighted mean of 3.20 and 3.09 respectively. Lastly, the item "The teacher used PowerPoint presentation." was interpreted as "sometimes" and has an average weighted mean of 2.99. The overall extent of instructional materials used by the Mathematics teachers as perceived by the students gained "often" result with an overall average weighted mean of 3.51. This means that the used of instructional materials helped the student's to learn fast and better and its appropriateness has a positive effect to their Mathematics performance.

Table 6. Level of Performance of Students in Mathematics

Statistics	Value	Verbal Interpretation
Mean	84.38	Satisfactory
Standard Deviation	4.68	

Table 6 [11], presents the level of performance of Grade 11 students in Mathematics in terms of some measure as mean and standard deviation. The means of grades of student's respondents are midterm grade period provided by the students. Table describes that the mean learning of students in mathematics was "satisfactory" with an average of 84.38 and standard deviation of 4.68. It means that several of the students really liked the subject of mathematics. Only few of the students got low and the rest got the high grades.

Table7. Results of Multiple Regression Analysis

Model	Unstandardized Coefficients		Standardized Coefficients		Sig.
	B	Std. Error	Beta	T	
1 (Constant)	4.039	.410		9.848	.000
Interest	-.086	.103	-.060	-.838	.403
Study Habits	.089	.089	.073	1.003	.317
Personality Traits	.033	.089	.032	.372	.710
Teaching Skills	-.035	.097	-.033	-.358	.721
Instructional Materials	.040	.063	.044	.640	.523
R = .086 F-value = .386					
r ² = .007					

Table 7 describes the significant relationship of the factors relating Mathematics Learning of Grade 11 Senior High school STEM students of University of Science and Technology of Southern Philippines. Multiple regression analysis was used to test for significant relationship between student-related factors and teacher-related factor, and the students' mathematics performance.

Multiple regression analysis was used to test for significant relationship between student-related factors and teacher-related factor and the students' mathematics performance. The results of the regression indicated the two predictors, student-related factors and teacher-related factors, explained .07% of the variance. With the test of significance, the researcher builds up with the following conclusion; there is no significant relationship between students' interest in Mathematics and their learning in Mathematics. There is no significant relationship between students' study habits and their learning in Mathematics. This explains that the learning of the students in Mathematics was not predicted by the student-related factors in terms of interest and study habits.

There is no significant relationship between teacher-related factors such as personality traits, teaching skills and instructional materials and the learning of the students in Mathematics. Thus, the teacher-related factors do not predict the learning of the students in Mathematics.

4. CONCLUSION AND RECOMMENDATION

Based on the finding of the study, the following conclusions were drawn:

Student-related factors in terms of interest have a great extent to the students resulting to high grade in Mathematics. Student-related factors in terms of study

habits have a great extent to the students resulting to high grade in Mathematics. Teacher-related factors in terms of personality traits have a great extent to the students resulting to high grades in Mathematics. Teacher-related factors in terms of teaching skills have a great extent to the students resulting to high grades in Mathematics while in terms of instructional material, students resulting to high grades in Mathematics. Level of performance of the students in Mathematics was satisfactory which means that they are performing well in Mathematics subject. The student-related factors in terms of interest and study habits do not affect the Mathematics performance of the students. The interest of the students whether great or less does not relate to the achievement in mathematics. Study habits of the students, good or not, does not relate to the achievement of the students in mathematics. The personality of the teacher does not relate to the achievement of the students in mathematics. Whether an instructor is an expert or not, does not relate also to the achievement of the students in mathematics. In terms of instructional materials, whether the teacher is using more, less, innovative, or traditional, does not relate to the achievement of the students in mathematics. The following recommendations are deemed offered based upon the findings and conclusions of the study. Training on the teachers may be conducted more often by the administrators so they can keep abreast with new trends regarding the teaching of the subject. For future researchers, since there is not enough evidence to conclude that any of the variables have a statistically significant relationship with students' mathematics performance the results merit that further study using different sets of variables for more data gathering. This study should be replicated on other Mathematics subject for further verification.

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