



Correlates of Students' Performance in Geometry

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ABSTRACT

Geometry is a mathematical system which is based on undefined terms, assumed relations, proved and unproved statements. Geometry is a subject taught in high school in preparation for higher courses in college and it is considered as a difficult subject by many students. This quantitative study was conducted to determine the correlates of students' performance in geometry of the 260 third year students of Buug District in Zamboanga Sibugay during the school year 2008-2009. The questionnaire-checklist was administered to the teachers' handling geometry and test questions to the third-year students. A Chi-square test was utilized in testing to determine if the significance relationship between the two variables exists. The findings revealed that the teachers teaching geometry were Bachelor of Secondary Education degree holders with mathematics as their area of specialization. The teachers were very competent in teaching geometry although there were a few who revealed they were just competent in dealing with the different learning competencies in geometry. No significant difference was noted between the teachers' level of teaching competence when they were grouped by profile since all of them disclosed similar profiles. The students' study habits were found to be somewhat good based on their self-perceptions. The students have satisfactory performance in geometry as revealed in their test scores. A significant relationship was noted between the teachers' competence in teaching geometry and the students' level of performance in the test. A significant relationship was evident between the teachers' personality traits and the students' performance in geometry as revealed in their test scores. The students' performance in geometry was significantly related to their study habits. Therefore, the teachers should work towards the highest level of their teaching performance and develop wholesome attributes in teaching as well as encourage students in developing good study habits to bring optimum performance results.

Keywords : geometry, competence, personality traits, study habits, Mathematics performance

1. INTRODUCTION

Geometry is a mathematical system which is usually concerned with undefined terms (lines ,points and plane),surfaces ,and solids. This mathematical system is based on undefined elements , assumed relations, unproved statements (postulates and assumptions) and proved statements (theorems and corollary). It is generally divided into two divisions, the pure and analytic or coordinate geometry. Pure geometry involves the plane and solid geometry involves problem solving using algebraic methods. This course begins with the practical application of the systematic understanding of shapes, sizes, geometric relations, triangle congruence , properties of quadrilaterals , similarity of triangles , circles and plane coordinate geometry.

Geometry is a subject taught in high school in preparation for

the higher courses in college. Studying geometry needs the use of precise and accurate analysis in solving problems. Hence, it is the task of the mathematics teachers to study and search deeper into the realm of geometry to find out why this subject is considered difficult by many students. Almost all things around involve geometry, the shapes, sizes, numbers or quantities, and time. Thus, geometry is very important to every individual because the knowledge that one gains from studying it makes one's life more fruitful and enjoyable. It can only be meaningful if the learners are allowed to explore to the extent of mathematical concepts, relationships and possibilities in the environment. However, many students found geometry as a barrier to their achievement. They find it difficult to learn compared

to other subjects. With this fact, many students finished their high school education without even knowing the application of what they had studied and its importance to everyday living. As such, they encounter more problems when they reach college and meet the same

subject.

So, at this early stage, the learner should be taught the mathematical skills possible in the most interesting way through varied strategies in teaching and learning situations where they could gain mastery of the skills with valuable meaning and apply it in everyday living. Sagrado and Monteberos (2002) stressed that a teacher in geometry must provide great opportunities in forming the mind of the students. If he uses his allotted time with drilling his students in routine operation, he kills the interest, hampers their intellectual development and misuses his opportunity. But if the teacher challenges the curiosity of his students by giving them problems proportionate to their knowledge and helping them solve their problems, he may give them a taste and some means of independent thinking.

Fever verger (1997) said that the teachers' perceptions of themselves in terms of their role in the educational enterprise and their attitudes towards their students may have the greatest impact on the success of learning and to take place within their classrooms. Classroom variables have shown to affect the attitude and achievement that include the teachers' personality, method of teaching of the students and their assessment of the subject.

Demecillo as cited by Soronio (1999) revealed that the study habits of the students were directly related to their achievement in Mathematics. As the minutes of studying mathematics lessons increased, the number of achievers in mathematics also expanded regardless of sex.

Herrera (1999) on the other hand, stressed that many students have a low performance in mathematics because most of them do not know and do not have effective study habits. Effective study habits are a very important part of the learning process. Good study habits are about keeping a daily routine and giving all subjects equal treatment. Good study habits are important to all students to protect investments of time and money and to achieve educational goals.

Larsen as cited by Rubio (2008) said that the major goals for the students to achieve proficiency in mathematics is to develop an understanding of mathematical concepts, and the ability to use mathematical reasoning to solve mathematical problems, including recognizing and solving routine problems readily and finding ways to reach a solution or goal when no routine path is apparent. Furthermore, Larsen added that by meeting the goals of mathematics, students will achieve greater proficiency in practical uses of mathematics in everyday life. This will help the students understand their world and be productive members of the society.

According to Talaga (1993) results of achievement tests given to students at the end of the school year reveal the deterioration of the students' performance. This can be attributed to poor study habits. At an early age, children should learn to prioritize their activities and devote more time to studying.

With these facts the researcher came up with this study because it is believed that identifying some factors that really affects the students' performance in mathematics particularly in geometry.

It is in this context that the researcher, a mathematics teacher,

investigated the correlates of students' performance in geometry to reveal the relationships between the teachers' profile, the teachers' teaching competence in geometry, the teachers' personality traits and students' study habits and the students' performance in geometry during the school year 2008-2009 for the purpose of helping the students to improve their performance in geometry.

1.1 THEORETICAL FRAMEWORK

This study was based on the scaffolding theory by Bruner (1976). This theory states that the teachers' personality traits have a great influence in nurturing students' abilities and skills. Bruner believed that students need the help of teachers and adults as active support. The teachers affect the achievement of the students inasmuch as the students will do what the teacher says. He suggested that teachers should try to develop in the students the ability to tackle a problem by themselves and derive satisfaction from discoveries. With these the researcher came up with some correlates of students' performance in mathematics particularly in geometry.

1.2 STATEMENT OF THE PROBLEM

This study aims to determine the correlates of the students' performance in Geometry of the third-year high school students of Buug District in Zamboanga Sibugay during the school year 2008-2009.

Specifically, this study sought answers to the following questions:

1. What is the profile of geometry teachers in terms of educational qualification and field of specialization?
2. What is the level of competence of teachers in teaching geometry?
3. Is there a significant difference in the level of competence of teachers in teaching geometry when they are grouped by profile?
4. What are the personality traits of teachers teaching geometry?
5. What is the students' level of study habits in geometry?
6. What is the performance of students in Geometry?
7. Is there a significant relationship between the profile of geometry teachers and the students' performance in geometry?
8. Is there a significant relationship between the level of competence of teachers and the students' performance in geometry?
9. Is there a significant relationship between the personality traits of teachers and students' performance in geometry?
10. Is there a significant relationship between the students' level of study habits and their performance in geometry?

2. METHODOLOGY

2.1 RESEARCH DESIGN

This study used a descriptive-correlational method of research which was designed and aimed to determine the correlates of students' performance in geometry of Buug District in Zamboanga Sibugay Province during the school year 2008-2009.

2.2 RESEARCH RESPONDENTS

A total of 260 third year students or around 40 percent and who are presently enrolled in the secondary schools of Buug District in Zamboanga Sibugay Province during the school year 2008-2009 were the respondents of the study. These students were chosen by random sampling or raffle type of sampling using the table of samples by Ardales (1992:60). Then, proportional sampling from randomly selected respondents was employed to come up with the desired number of samples.

2.3 RESEARCH INSTRUMENT

The data were derived from questionnaires that include the students' level of performance as revealed on the test results. Questions were centered on the teachers' educational qualification and field of specialization; teaching skills and personality traits; and students' study habits and a 50 -item test in geometry. These questionnaires were validated since the validity of the study depends largely on the validity of the instruments.

The teachers' teaching skills and personality traits consisted of seven items with five alternatives for the responses. The frequencies of individual items were tabulated to determine the level of competence of teachers in teaching geometry as well as the teachers' personality traits. The following scoring and interpretations were used.

Table 1. Teachers' Teaching Skills

Scores	Responses	Continuum	Interpretation
31-35	Strongly Agree (SA)	4.50-5.00	Very competent (VC)
25-30	Agree (A)	3.50- 4.49	Competent (C)
19-24	Undecided (U)	2.50-3.49	Somewhat Competent (SW)
13-18	Disagree (D)	1.50-2.49	Fair
7-12	Strongly Disagree	1.00-1.49	Poor (P)

Table 1 shows the scoring and interpretations used for teachers' teaching skills.

Table 2. Teachers' Personality Traits

Scores	Responses	Continuum	Interpretation
31-35	Always (A)	4.50-5.00	Very good (VG)
25-30	Often (O)	3.50- 4.49	Good (G)
19-24	Sometimes (S)	2.50-3.49	Somewhat Good (SW)
13-18	Rarely (R)	1.50-2.49	Fair (F)
7-12	Never (N)	1.00-1.49	Poor (P)

Table 2 shows the scoring and interpretations used for teachers' personality traits.

Table 3. Students' Study Habits

Scores	Responses	Continuum	Interpretation
43-45	Always (A)	4.50-5.00	Very good (VG)
35-42	Often (O)	3.50- 4.49	Good (G)
27-34	Sometimes (S)	2.50-3.49	Somewhat Good (SW)
19-26	Rarely (R)	1.50-2.49	Fair (F)

10-18	Never (N)	1.00-1.49	Poor (P)
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Table 3 shows scale continuum, scoring and interpretations for students' study habits.

Table 4. Students' Performance in geometry

Scores	Level of Achievement
41-50	Very Satisfactory (VS)
31-40	Satisfactory (S)
21-30	Fair (F)
11-20	Poor (P)
1-10	Very Poor (VP)

Table 4 shows the scoring and interpretations of a student's performance in geometry.

2.4 DATA GATHERING PROCEDURE

Before the actual administration of the research instruments, the researcher secured permission from the OIC dean, Graduate School, Misamis University, Ozamis City that he be allowed to conduct this study . The researcher also approached the school heads to allow him to conduct the study in their respective schools.

Upon the approval of the letter- request, the researcher sent the questionnaire and test to the students. The teachers in mathematics of the respective schools were also requested to answer the questionnaire regarding their profile, skills in teaching geometry and their personality traits.

All data and information gathered were classified, organized, analyzed and interpreted in accordance with the purpose of the study.

3. RESULTS

The findings in this study are summarized based on the sequence of topics presented in the statement of the problem.

Table 5. Profile of Teachers Teaching Geometry

Profile	Frequency	Percentage
Educational Attainment		
BSED	8	100.00
With M.A. units	8	100.00
Area of Specialization		
Major in Mathematics	8	100.00

Table 5 shows the educational attainment and field of specialization of teachers teaching Geometry. There were eight teachers teaching geometry in the eight secondary schools of Buug District. All of the teacher-respondents, or 100 percent, were Bachelor in Secondary Education degree holders and had mathematics as their major area of specialization. They were able to earn units in the graduate school as indicated in the data, but no one was a full-fledged master's degree holder, hence they could not proceed to earn units in the doctoral degree.

It could be inferred that these teachers teaching geometry

have the competence in teaching the subject as they have fulfilled the necessary educational requirements in college. They have also updated on the recent trends in teaching mathematics as much as they were able to enroll in graduate school. The teachers are equipped with the knowledge and skills to allow their students to master learning competencies required to learn for the whole school year.

The teachers were very competent in teaching geometry although there were a few who revealed they were just competent in dealing with the different learning competencies in geometry.

No significant difference was noted between the teachers' level of teaching competence when they were grouped by profile inasmuch as all of them disclosed similar profile.

Table 6. Summary of Teachers' Personality Traits

Personality Traits	Frequency	Percentage
Very Good (VG)	1	2.50
Good (G)	5	62.50
Somewhat Good (SG)	-	-
Fair (F)	2	25.00
Poor (P)	-	-
Total	8	100.00

Table 6 shows the personality traits of the teachers teaching geometry. The teachers claimed they have a good personality trait in terms of conducting themselves during instruction or when they discussed the lessons in geometry. One out of 8 or 12.50 % of teacher teaching geometry disclosed that he/she has a very good personal attributes; 5 out of 8 or 62.50 % of teachers teaching geometry believed they have good personality traits ; while 2 out of 8 or 25.00% of teachers teaching geometry said they manifested fair behavior when it comes to teaching geometry.

These teachers may be very strict in their instruction inasmuch as geometry needs analytical thinking to be able to arrive at the correct answer to a problem or exercises. They just want their students to learn by being attentive during class discussion or by being active in performing their class outputs.

Table 7. Summary of Students' Study Habits

Study Habits	Frequency	Percentage
Very Good (VG)	24	9.23
Good (G)	41	15.77
Somewhat Good (SG)	113	43.46
Fair (F)	47	18.08
Poor (P)	35	13.46
Total	260	100.00

Table 7 shows the students' study habits as perceived by them. The students' study habits were found to be somewhat good based on their self- perceptions. 24 or 9.23% of the students perceived they have "very good" study habits; 41 or 15.77 % "good"; 113 or 43.46 % "somewhat good" 47 or 18.08 % "fair" ; while 35 or 13.46 % of the students felt they have not fully developed the habit of studying their lessons.

Teachers and parents should give constant guidance to these

students on how to build their study time to finish more significant tasks in performing activities in geometry; thereby improving their performance in any subject in school.

Table 8. Performance of Students in Geometry

Performance/ scores	Frequency	Percentage
Very Satisfactory(VS) 41-50	18	6.93
Satisfactory (S) 31-40	59	22.69
Fair (F) 21-30	102	39.23
Poor (P) 11-20	61	23.46
Very Poor (VP) 1-10	20	7.69
Total	260	100.00

Table 8 shows the performance of students in geometry. The students have fair performance in geometry as revealed in their test scores. 102 or 39.24 % of the students scored between 21- 30 which is described as "fair"; Only 18 or 6.93% got scores between 41-50 or " very satisfactory"; 59 or 22.69 % scores between 31-40 or " satisfactory" ; 61 or 23.46% scored between 11-20 or "poor" ; while 20 or 7.69% obtained only 1-10 correct answers or " very poor" level of achievement in geometry.

The data show that only 29.62 % among the student-respondents in the District of Buug were able to master the learning competencies prescribed by the Basic Education Curriculum (BEC) of secondary schools in the Department of Education.

It is sad to note that around 70.38 % of the students tested got scores considered as " Fair", " Poor" and " Very Poor". These students failed to master the learning competencies prescribed by the Basic Education Curriculum (BEC) of secondary schools in the Department of Education.

The teachers should identify what areas/topics in geometry where the students failed to answer correctly. They may use some tools in geometry and teaching devices that would help the students visualize and understand problems in geometry. Some students simply do not understand the information or feel that there is too much work to do but little time to complete or or study the subject.

Table 9. Teaching Competence and Students' Performance

Teaching Competence	Very Competent	Count	Students' Performance					Total
			VS	S	F	P	VP	
Teaching Competence	Very Competent	Count	12	39	74	17	8	150
		% within teaching competence	8%	26%	49.3%	11.3%	5.3%	100%
Teaching Competence	Competent	Count	6	20	28	44	12	110
		% within teaching competence	5.5%	18.2%	25.5%	40.0%	10.9%	100%
Total	Total	Count	18	59	102	61	20	260
		% within teaching competence	6.9%	22.7%	39.2%	23.5%	7.7%	100%

$$X^2 (4) = 36.320, p = .000$$

Table 9 shows the relationship between teaching competence of teachers handling geometry and the students' performance in geometry. As reflected in the table a test yielded a Chi-square value of 36.320 with p value of .000 which implied to reject the null hypothesis at 0.05 level of significance. Therefore, it can be concluded in the results that there was a significant relationship between the teachers' competence in teaching geometry and the students' level of performance in the test.

There was sufficient evidence to say that teachers' competence to teach affects the students' achievement in geometry as revealed in the test scores.

Table 10. Teachers' Personality Traits and Students' Performance

		Students' Performance						Total
		VS	S	F	P	VP		
Teaching Competence	Very Good	Count	5	13	27	7	5	57
		% within teachers' Personality Traits	8.8%	22.8%	47.4%	12.3%	8.8%	100%
	Good	Count	7	19	63	32	7	128
		% within teachers' Personality Traits	5.5%	14.8%	49.2%	25.0%	5.5%	100%
	Fair	Count	6	27	12	22	8	260
		% within teachers' Personality Traits	8.0%	36.0%	16.0%	29.3%	10.7%	100%
Total		Count	18	59	102	61	20	260
		% within teachers' Personality Traits	6.9%	22.7%	39.2%	23.5%	7.7%	100%

$$X^2 (8) = 30.701, p = .000$$

Table 10 shows the relationship between teachers' personality traits and the students' performance in geometry. As reflected in the table a test yielded a Chi-square value of 30.701 with p value of .000 which implied to reject the null hypothesis at 0.05 level of significance. Therefore, it can be concluded in the results that there was a significant relationship between teachers' personality traits and the students' level of performance in the test.

The students' ability to get many correct answers in the test in geometry relied mainly on the teachers' attributes like being friendly and courteous in dealing with the students, giving praises for a work well done or always stimulating students through interesting and original materials and techniques.

If students are always encouraged to work through their own problems and evaluate their own accomplishments, most likely they would be able to remember the procedures and thus gain positive results in the test.

Table 11. Students' Study Habits and Students' Performance

		Students' Performance					Total
		VS	S	F	P	VP	

Study Habits	Very Good	Count	4	4	6	5	5	24
		% within Study habits	16.7%	16.7%	25.0%	20.8%	20.8%	100%
	Good	Count	6	6	22	4	3	41
		% within Study habits	14.6%	14.6%	53.7%	9.8%	7.3%	100%
	Somewhat good	Count	18	18	55	12	11	114
		% within Study habits	15.8%	15.8%	48.2%	10.5%	9.6%	100%
	Fair	Count	8	8	8	10	9	47
		% within Study habits	5.5%	18.2%	25.5%	40.0%	10.9%	100%
	Poor	Count	3	2	9	11	13	38
		% within Study habits	7.9%	5.3%	23.7%	28.9%	34.2%	100%
Total		Count	39	38	100	42	41	260
		% within Study habits	15.0%	14.6%	38.5%	16.2%	15.8%	100%

$$X^2 (16) = 40.331, p = .001$$

Table 11 shows the relationship between students' study habits and the students' performance in geometry. As reflected in the table a test yielded a Chi-square value of 40.311 with p value of .001 which implied to reject the null hypothesis at 0.05 level of significance. Therefore, it can be concluded in the results that there was a significant relationship between students' study habits and the students' level of performance in the test.

It goes to show that when the students keep a daily routine in studying their lessons in geometry, they most likely have a better chance to get higher scores in the test. Conversely, if their study habits are weak, they would also get very poor results in the test, or any evaluation done by the teacher.

Good study habits are an important part of any students' success. The teachers should help the students develop good study habits by encouraging them to study before and while they do the homework. Being organized and having homework routines can help the students develop good study habits for life.

In summary, the students' performance in geometry is dependent upon the teachers' educational qualification, field of specialization, their level of competence in teaching geometry, their personality traits as well as students' own study habits. These variables would clearly contribute to the students' level of performance in geometry.

4. CONCLUSION

On the basis of the forgoing findings, the following conclusions are drawn.

The teachers teaching geometry were qualified to teach the subject because they were graduates with a Secondary Education degree, majoring in mathematics. They were able to carry out the learning competencies to be mastered by the students in as much as they claimed to be very competent in teaching geometry. All geometry teacher-respondents delivered the lessons very well as manifested by their educational profile. The teachers possessed personal attributes

that were favorable to the students inasmuch as they provide the students the emotional support to make them understand the lessons in geometry.

The students have not mastered the learning competencies in geometry as expected from them because their performance in geometry ranged between fair and very poor, and they lack good study habits to be able to fully utilize their potentials in understanding geometry.

The components of the study considered as correlates to the students' performance in geometry are the teachers' teaching competence; the teachers' personal characteristics while teaching the subject; and the students' study habits.

5. RECOMMENDATIONS

Based on the findings and conclusions, the following recommendations are presented.

1. The teachers can improve their personal characteristics in teaching geometry if they conduct clear and practical demonstrations and explanations on how theorems are proven using SSS, SAS and ASA.
2. The teachers should continue to grow professionally by enrolling in a graduate program majoring in mathematics to hone their skills and competence to teach the subject.
3. The students should be encouraged to spend longer time studying different kinds of angles in a triangle, especially on parallel lines cut by a transversal because that is where they obtained many errors in their answers.
4. There are students who learn best through seeing, therefore, teachers must draw diagrams or sketches when setting up problems in geometry and visualize information as a picture to aid memorization of axioms, theorems and principles.
5. Teachers should always use visual aids and ask higher order thinking skills questions to challenge the students to participate verbally or in written form to develop the students' ability to attain a very satisfactory/satisfactory rating in geometry.
6. Students who have trouble in studying may be required to see their mathematics teachers every after class in the morning or in the afternoon so that they could be assisted on what study skills to develop that would hone their potentials in geometry.
7. Teachers should work towards the highest level of their teaching performance and develop wholesome attributes in teaching as well as encourage students in developing good study habits to bring optimum performance results.

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