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Legitimizing Interrelationship Of Potent Factors And Mathematics Performance

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ABSTRACT
This research determined the interrelationship of the potent factors and Mathematics performance of the Grade 10 students in the West Toledo District, Toledo City Division for the School Year 2017 – 2018 as a basis for a proposed development program. The descriptive method of research was utilized which aimed primarily at gathering data about the study. The researcher–made and validated questionnaire was used to determine whether the identified factors had a relationship with the math performance were answered by the 764 respondents composed of the Grade 10 students of West Toledo District. Of the nine sub-factors which were believed that have a relation to the performance in Mathematics, study habits, attitude towards the subject, lack of information and communication technology (ICT) facilities, and parental involvement were found out to be the influencing factors. It was found out that there was a relationship among variables. Teachers played a vital role in the academic performance of the students. They should devise a plan on how to develop good study habits among students and a positive attitude towards the subject. It is hereby recommended that the proposed development plan of this research be adopted.

Keywords: Development Education Legitimizing Interrelationship Potent Factors Mathematics Performance Descriptive Method

1. INTRODUCTION

Mathematics is a learning area that has been said to be the queen of the sciences according to Carl Friedrich Gauss, one of the most brilliant mathematicians. It is an all-inclusive learning region with a rich, differing and dynamic hypothesis that

traverses a different scope of uses. It is considered as the establishment of most present-day quantitative and subjective investigations.

It is a symbolic language that enables human beings to think, record, and communicate ideas concerning the elements of the relationship of quantities. Its permanence and universality throughout the ages is a consequence of its very nature.

Mathematics 10 is Algebra, Geometry, Trigonometry, Probability, and Statistics. It deals with the properties and relationships of quantities including arithmetic, geometry, algebra, trigonometry and statistics, and probability. This is integrated mathematics designed under the K to 12 Curriculum suited to the needs of the students of today's generation. The students are exposed to different problems which they can use in actual situations. The researcher believed that if the student can fully understand these topics, it will make him/her equipped with the knowledge to be ready for the second mathematics course.

The main concern on the significance of mathematics falls into three areas: mathematics is a core subject for all, generally; a mathematically slanted society will doubtlessly add to the nation's financial advance.

The challenge to be relevant and updated is a reality in every field of endeavor in any society. This is the clearest in the teaching profession. Move-in focus and convictions concerning the educator's part and capacity in the classroom require to continue with training and practical advancement for the teacher. The present pattern is on the selection of inventive techniques in education. They should be profoundly proficient and viable to deliver all qualified graduate who requires the utilization of present-day innovation in the classroom.

General numerical abilities are valued in some organizations, but in many, they are seen as important. It appears that utilizing the aptitudes in arithmetic adequately is necessary to an assortment of undertakings, for example, costing, hazard appraisal, and quality control and demonstrating and critical thinking are winding up more progressively essential.

In this regard, despite the efforts made by teachers and administrators to make mathematics interesting, there are still several students who cannot stand the sight of numbers. There are even students who are intelligent but are low achievers in mathematics. This observation of the researcher is shared by teachers of other disciplines. They all agree that students show less interest in numbers.

The preparation of subject teachers, school officials, and students is not easy for it's not a usual test they do from day today. It is made by the national office of the Department of Education where the test questions are extracted from the competencies in the year level. Private and public schools are involved in this test and students are expected to reach 75 percent mastery level. The reviewing of the past lessons gained from Grade 7 to Grade 10 competencies is seriously directed. Educators and students both allot additional time even on Saturdays just to expand the past outcome to 75 percent or more up with the goal that the schools would not be classified low performing schools in the nation.

Educators need to deplete all ways to meet the deficiency of all students and distinguish who have learning troubles to eradicate misconstruing and be given help. They are producing photocopies of review materials for the students to feel at ease every review time using their resources. They must find ways just to meet their goals to increase the previous result. It can't be denied also that most students in the barangay schools come from poor families and spending money for their reviewers is not more important, and teachers have to find other resources.

Aside from the reviewers, the school conducts a mock test in preparation for it that could probably assess the students and serve as a guiding compass for teachers. The preparation is not easy but because of the maxim, "If you have grown good seeds, you can reap good harvest too," teachers' mission and vision in education prevail. Even though their time for the family was briefly borrowed both from the students and instructors in allotting additional time in school for the task, they trust that in the proverb, "Work will be finished by men on earth, Blessings originate from God." The whole teaching power in the schools was expecting the great performance of students in this manner creating great outcomes, alongside the assistance of the Lord's favors around then to have an alluring outcome in the NAT or National Achievement Test.

National Achievement Test is important because it tests the knowledge of selected private and all public school students to know the improvement of the quality of education in public and private schools and to provide appropriate intervention for the students. It plays an important role in the activity, and published test materials are widely used in both elementary and secondary school levels. Some tests consist of an integrated series of survey tests and group-administered diagnostic tests covering the same areas of basic skills. In addition to achievement tests, there are many single-subject achievement tests designed to measure achievement in specific areas.

Mathematics teachers employ eclectic methods in teaching mathematics. Alternative methods and strategies are requiring higher-order thinking skills, cooperative learning, and others just to improve student achievement.

Negative attitudes towards the subject are damaging, leading to the inability to solve problems, increased anxiety and a lack of self-confidence, and reluctance to try to hone the skills. The impact of low numeracy significantly affects not only individuals' life chances, but also the economy and international competitiveness, especially in an increasingly technology-centric society.

It was observed in the school where he supervises that some students in the lower sections had not mastered the basic skills of elementary mathematics as expected from them. They need to be reviewed of their past lessons before going to the new one. Lack of prerequisite skills is a necessity before they can go advance topic as required from them. The K to 12 Curriculum is a spiral in progression in which the degree of difficulty becomes higher as they progress in each level. Even the teacher exerted more effort just to raise the performance of the students, there is still something missing in the link to achieve a quality result. Moreover, the previous

achievement tests had proven that students were low performers in the field of mathematics.

This study is conceived to determine what were the factors that were contributory to the low performance of the students, and what will be the action to be taken to raise such performance.

This study is anchored on the Social Learning Theory of Albert Bandura (1997). He pointed out the assumption where the theory is based on the nature of the learning process in the naturalistic setting, the relationship of the learner to the environment, and a definition of what is learned. In this case, the hindering factors for students' achievement should be properly addressed to avoid bigger problems in the future. All the necessary things which were contributory to their performance must be properly aligned so that no more difficulties will be encountered by them.

The need for achievement involves competencies. Another need that includes the desire to excel, to complete difficult tasks, to meet high standards, and to outperform others requires perseverance and cooperation of some factors. Among others, student achievement bears the name of the teachers, the school, and his environment. Those who have a great need for achievement called high-need achievers differ from low-need achievers in several ways, such as the desire to accomplish a certain task and others.

Under-achievement of students was caused by several factors that influenced the learner positively or negatively. Teaching underachievers is the most difficult task of a classroom teacher. Thus, the teacher must take caution in teaching underachievers so that the contributing factors to low performance can be properly handled.

At the onset of the study, the researcher considered all these factors as contributory to low achievement in mathematics. It was revealed historically that parents have participated less in school activities during the students' high school years than they did during the elementary years. The involvement of parents in the educative process of their children plays a vital role in the enhancement of the necessary skills that the students should acquire. Making follow ups of their assigned task as soon as they arrived home proved to be an effective way to help them in their studies.

The theoretical – conceptual framework was based on the Social Learning Theory of Albert Bandura which is said to be a combination of behavioral and cognitive perspectives into a personality that stresses the interaction of thinking humans with the social environment that provides learning experiences. The social learning perspective is based on both internal and external factors that led to the idea of reciprocal determinism – the person, the person's behavior, and the environment. Albert Bandura claims that people are psychological creatures who have dynamic processing of data. Furthermore, such a movement assumes a noteworthy part in learning, conduct, and advancement. There are three central ideas at the core of the social learning hypothesis. In the first place is the possibility that individuals can

learn through perception. Next is the possibility that inside mental states are a basic piece of this procedure.

Bandura placed his cognitive emphasis on observational learning as the most important means of changing human behavior. By imitating other people, we learn how to do some actions, perform some rhythmic patterns, or tackle math problems.

The "Mathematics Framework for Philippine Basic Education" which is currently being implemented advocates using a variety of teaching strategies among which are practical work, discussion, problem-solving, investigations besides exposition and practice and consolidation, as well as cooperative learning (Department of Education 2002).

Based on the theory of Bandura and the mandate of the state to produce quality graduates, this research entitles "Legitimizing the Interrelationship of the potent factors and mathematics performance" came into the mind of the researcher whether the identified factors have something to do with the performance of the students in Mathematics.

2. METHODS

Research Design

The research utilized the descriptive method which aimed primarily at gathering knowledge about the object of the study but does not wish to modify the object. The target is to find out how things are, how they have been, and how things should be.

In a descriptive method, Calmorin (1994) as cited by Bagayana (2006) explained that this method deals or focuses on the present condition. The purpose is to find new truth, which may come in different forms such as the increased quantity of knowledge, a new generalization, or increased insights into factors.

The aspects investigated were the different factors that interrelate the Mathematics performance of Grade 10 students of the West District of Toledo City Division which include the student, school, teacher, and home factors. Students factors include students' attitudes and study habits. School factors comprise the availability of learning materials and the school environment. Teacher factors were composed of motivational techniques, teacher's teaching methodology, and character traits. The home environment included the socio-demographic profile of students and parental support.

The findings of the study will lead to the formulation of a development plan that may help the students to perform better in Mathematics.

Research Respondents

The West District, Toledo City Division was the locale of the study. The district is composed of five (5) secondary schools and the respondents of the study were the Grade 10 students of the West District, Toledo City Division during the School Year

2017 – 2018. All the students in Grade 10 in each school were considered in the study for a total of 764 students.

Data Collection Tools

The tool utilized as a part of this investigation was a researcher-made survey based on the readings of the researcher. The questionnaire consisted of the four (4) factors which included the student factors, school factors, teacher factors, and home factors that interrelate the performance of the students in mathematics. Under the student factors, the study habits and attitude of the students towards the subject were taken into consideration. In the school factors, the school environment and availability of learning materials were considered. In the teacher factors, the methods of teaching, motivation, and teacher character traits were included. In the home factors, the socio-demographic profile, parental support, and home environment were included in the study.

On the questionnaire was the students' level of interest in Mathematics presented by ten situations. These were given one (1) set of four checkboxes each. The four (4) checkboxes were ranked as four (4) which is interpreted as Always as perceived by the respondents, three (3) which is interpreted as Sometimes as experienced by the respondents, two (2) interpreted as Rarely as perceived by the respondents and lastly one (1) and is interpreted as Never as experienced by the respondents.

The questionnaire checklist was presented to the adviser for comments, corrections, modification, and suggestions on the content ready for the use of the research.

3. RESULTS

Table 1 Students' Less Mastered Skills in National Achievement Test

Division MPS: 60.72

Competencies	Percentage Of Correct Responses	Level Of Mastery

1	Solve problems involving quadratic functions and equations	74.99
	LM	
2	Find by synthetic division, the quotient and the remainder when p(x) is divided by (x-c)	74.51
	LM	
3	Find the root of a quadratic equation by completing the squares	73.45
	LM	
4	Apply knowledge and skills related to circular function and trigonometric equation in problem-solving	73.32
	LM	
5	Solve problems involving exponential and logarithmic functions	73.30
	LM	
6	Given f(x) = mx + b, determine the following slope	73.08
	LM	
Giv 7	Given a unit circle and an angle in standard position, determine the coordinates of its terminal side	70.68
	LM	
8	Find the zeroes of a polynomial function of degree greater than 2 by – synthetic division	70.57
	LM	
9	Given a quadratic function, determine: - highest and lowest point (vertex)	68.37
	LM	
10	Determine the inverse of a given function	66.87
	LM	
11	Given a quadratic function, determine: - the axis of symmetry	65.97
	LM	
12	Solve simple trigonometric equations	64.76
	LM	
13	Find the zeroes of polynomial functions of degree greater than 2 by – Factor Theorem	63.49
	LM	
14	Interpret data	60.54
	LM	

15	Solve problems involving linear functions	58.31	LM

Legend: LM- Less Mastered (students attained 50 – 74%)

Table 2 Students' Not Mastered Skills in National Achievement Test
Division MPS: 60.72

	Competencies	Percentage Of Correct Responses Of Mastery	Level
1	Determine whether a given graph represents a function or a mere relation	47.58	NM
2	Solve simple logarithmic equations	44.81	NM
3	Find the measure of central tendency using ungrouped data – median	43.16	NM

Legend: NM- Not Mastered (students attained less than 50 %)

Table 3 Socio - Demographic Profile
N = 764

Areas	Frequency	Percentage

Number Of Siblings In The Family		
5 or more		201
	26	
4		259
	34	
3		157
	21	
2		102
	13	
1		45
	6	
Age		
20 years old and above		10
	1	
18 – 19 years old		97
	13	
16 – 17 years old		394
	52	
14 – 15 years old		263
	34	
Parent's Highest Educational Attainment		
Post Graduate		5
	0.5	
College Graduate		50
	7	
College Level		80
	10	
High School Graduate		66
	9	
High School Level		150
	20	
Elementary Graduate		272
	35	
Elementary Level		136
	18	
No Schooling		5
	0.5	
Combined Family Monthly Income		
P31,000 and above		9

	1	
P21,000 – P30,000		45
	6	
P11,000 – P 20,000		155
	20	
P5,000 – P 10,000		555
	73	
Approximate Distance Of School From Home (In M.)		
More than 1000		59
	8	
600 – 1000		187
	25	
200 – 500		412
	54	
Less than 100		96
	13	
Current Employment Status Of Parents		
Unemployed		49
	6	
Public employee		211
	28	
Contractual		178
	23	
Private employee		75
	10	
Self – employed		52
	7	
Homemaker		169
	22	
Unable to work		21
	3	
Retired		9
	1	

Table 4 Summary of the Perceptions of the Respondents' Groups
N = 764

Potent Factor	Weighted Mean	Descriptive

	Equivalent	
	Students	
Attitude	**2.81**	**Sometimes**
Study habits	**2.79**	**Sometimes**
	Schools	
	Availability of teaching	
Materials	**2.87**	**Adequate**
School environment	**3.23**	**Sometimes**
	Teachers	
Motivation	**3.30**	**Sometimes**
Method of teaching	**3.10**	**Sometimes**
Character traits	**3.14**	**Sometimes**
	Home	
Parental support	**2.67**	**Sometimes**

Legend: 3.26 – 4.00 -Always / Very Adequate
2.51 – 3.25-Sometimes / Adequate
1.76 – 2.50 -Rarely / Inadequate
1.00 – 1.75-Never / None

Table 5 Relationship Of The Potent Factors And Mathematics Performance
N = 764

Potent Factors Indicated	**Average Of Computed Result (Y) Factors (X)**	**Average Nat Pearson r**

Student Factor		
Attitude	**2.81**	**60.774**
	0.92	
Study Habits	**2.79**	**60.774**
	0.98	
School Factor		
Availability Of Learning Materials	**2.87**	**60.774**
	0.70	
School Environment	**3.23**	**60.774**
	0.87	
Teacher Factor		
Motivation	**3.30**	**60.774**
	0.92	
Methods Of Teaching	**3.10**	**60.774**
	0.81	
Teacher's Character Traits	**3.14**	**60.774**
	0.94	
Home Factor		
Parental Support	**2.60**	**60.774**
	0.90	

Legend:	**Value of r**	**Description**
	0.00 to ± 0.20	**slight correlation; almost negligible relationship**
	± 0.20 to ± 0.40	**low correlation; small relationship**
	± 0.40 to ± 0.70	**moderate correlation; relationship substantial**
	± 0.70 to ± 0.90	**high correlation; marked relationship**
	± 0.90 to ± 1.00	**very high correlation; very dependable relationship**

4.1 DISCUSSION

The study had salient findings of the National Achievement Test performance of the Grade 10 pupils. Most of the competencies/skills being tested were less mastered by the students. Of the 27 competencies, only nine (9) were mastered and the rest were less mastered and not mastered. Regarding the perception of the respondents on the identified potent factors such as student's attitudes and study habits, school's availability of learning materials and environment, teachers' motivation, methods of teaching and character traits, and home factors socio-demographic profile and parental support were influential factors to their poor performance. This means that

these factors had a relationship with mathematics performance. Best practices were done by schools to raise mathematics performance. To address this problem, a development plan was formulated.

4.2 CONCLUSION

The Grade 10 students' low performance in Mathematics as reflected by the results of the National Achievement Test was influenced by the identified potent factors. The low achievement was influenced by the students themselves, teachers' motivational technique, character traits, and method of teaching. Home environments, as well as the school environment, were also identified as influential factors.

The results have a connection to the social learning theory postulated by Bandura that learning is based on the conditions of the learning process, the conditions surrounding the students, and how the lessons are presented and taught.

REFERENCES

Adair, J. (2009). Leadership and Motivation. New Delhi, Replika Press PUT

Adunola, O. (2011), "The Impact of Teachers' Teaching Methods on the Academic Performance of Primary School Pupils in Ijebu-Ode Local cut Area of Ogun State," Ego Booster Books, Ogun State, Nigeria.

Aikens, N.L. & Barbarin, O. (2008). Socioeconomic differences in reading trajectories: the contribution of family, neighborhood, and school contexts.J. Educ. Psychology, 100, 235-251.

Akkuzu, N., & Akcay, H. (2011). An effective model to increase student attitude and achievement: Narrative including analogies. US-China Education Review, A5, 612-623.

Alarm, T.M & Farid S. (2011). Factors affecting teachers' motivation. International journal of business
and social sciences. Vol 2 No. 1

Ayeni, A.J. (2011), "Teachers professional development and quality assurance in Nigerian Secondary Schools," World Journal of Education, 1(2):143-149.

Aquino, Gaudencio V. (2003). Effective teaching. Third Edition. Arul Laurence, A.S. (2012). School Environment & Academic Performance of Standard Six Students, Journal of Educational and Industrial Studies in the World, vol. 2, issue 3 article 22.

Babiera, Belinda P. Factors Affecting Discriminating Students' Low and High Performance in College Algebra, 2003.

Bandura, A. Social learning theory. (1997). Englewood Cliffs, New Jersey: Prentice-Hall.

Berkowitz, Marvin, and Bier, Melinda Educational Leadership. The Whole Child. Volume 63. No.1, 2005

Bower, H. A., & Griffin, D. (2011). Can the Epstein model of parental involvement work in a high- minority, high-poverty elementary school? A case study. Professional School Counseling, 15(2), 77-87. doi:10.5330/PSC.n.2011-15.77

Burgess, F. "Factors Affecting the Learning of the Students". Teacher Journal. Vol. 12 No. 44, 2000.

Byoung-suk, K. (2012). Landscape Performance Research; School Environment & Students' Performance, Paper from Landscape Architecture Foundation.

Carr, N. (2013). Increasing the effectiveness of homework for all learners in the inclusive classroom. School Community Journal, 23(1), 169-182.

Chang, W. (2002), "Interactive Teaching Approach in Year One University Physics in Taiwan: Implementation and Evaluation," Asia-Pacific Forum on Science Learning and Teaching 3, (2002)

Demir, S., Kilinc, M., &Dogan, A. (2012). The effect of curriculum for developing efficient studying skills on academic achievements and studying skills of learners. International Electronic Journal of Elementary Education, Vol. 4 (3), 427-440.

De Planty, J., Coulter-Kern, R., & Duchane, K.A. (2007). Perceptions of parents involvement in academic achievement. The Journal of Education Research, 100(6), 361-368.

Eastman, J., Iyer, R., & Eastman, K. L. (2011). Business students' perceptions, attitudes, and satisfaction with interactive technology: An exploratory study. Journal of Education For Business, 86(1), 36-43.

Gonzalez-De Hass, A. R., Willems, P. P., & Holbein, D. M. F. (2005). Examining the relationship between parental involvement and student motivation. Educational Psychology Review, 17(2), 99-123. doi:10.1007/s10648-005-3949-7

Hansen, Joe B. “Student Performance and Student Growth as a measure of success: A evaluator’s perspective” Paper presented at the annual meeting of the American Educational Research Association New Orleans, Louisiana, April 25, 2000

Hattie, J. Visible Learning: A Synthesis of Over 800 Meta-Analysis Relating to Achievement, (New York: Routledge, 2009) 241

Heinze, Aiso. “Classroom and School Effectiveness”. Journal on Teaching. Vol. 20 No. 44, 2008.

Higgins, S., Baumfield, V., & Hall, E. (2007).Learning skills and the development of learning capabilities. Technical Report. In: Research Evidence in Education Library. London: EPPI Centre, Social Science Research Unit, Institute of Education, University of London.Lai, Y., & Vadeboncoeur, J. A. (2012). The discourse of parent involvement in special education: A critical analysis linking policy documents to the experiences of mothers. Educational Policy, 29, 867-897. doi:10.1177 /0895904812440501

http:/www.iea.nl/fileadmin/user_upload/IRC 2004/kiamanesm.pdf, 2000 http://www.parenting.com, 2011.

Hurlock, N.K. Teaching-learning mathematics. (2004). U.S.A.: Prentice-Hall Company. Lyons, A. (2012) Workers of tomorrow, Education in progress, Ministry of education and Scientific Research. Port Fortis: Fiji.

Mutsotso, S.N. and Abenga, E.S. (2010). Study methods for improving quality learning and performance in higher education. Educational Research and Review, Vol. 5 (12), 808-813

Ornstein, Allan C. “Research on Teaching Issues and Trends”, Journal of Teacher Education, 1985..

Osa-Edoh, G. and Alutu, A. (2012). A survey of students studies habits in selected secondary schools: Implication for counseling. Current Research Journal of Social Sciences, Vol. 4 (3), 228-234.

Petrosino, A., Morgan, C., Fronius, T., Tanner-Smith,E. & Boruch, R. (2012). Interventions in developing nations for improving primary and secondary school enrolment of children: a systematic review. 3ie grantee final review.

Rana, S. and Kausar, R (2011). Comparison of study habits and academic performance of Pakistani British and White British students. Pakistan Journal of Social and Clinical Psychology, Vol. 9, 21-26.

Razonable, Steven Y. Selected Variables Affecting the Achievement in Analytic Geometry of the freshmen students at the University of Cebu, Cebu City. S.Y 1997 – 1998: Educational Implications, 2000.

Sad, S., & Gurbuzturk, O.(2013). Primary school students and apos; parents and apos; level of involvement into their children and apos;s education. Educational Sciences: Theory and Practice, 13(2), 1006-1011.

Sunday, A.A. (2012). The Relationship among School Environment, Student Approaches to Learning and Their Academic Achievement in Senior Secondary School in Physics, International Journal of Educational Research & Technology, vol.3, issue1

Timperley, H., Wilson, A., Barrar, H., & Fung, I. (2007). Teacher professional learning and development: Best evidence synthesis iteration [BES]. New Zealand Ministry of Education. Retrieved from http://www.oecd.org/edu/school/48727127.pdf

Ushie, M.A., Onongha, G.I., Owolabi, E.O. & Emeka, J.O. (2012). Influence of family structure on students' academic performance in Agege local government area, Lagos State, Nigeria. European J. Educ. Studies,4, 177-187.

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