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Predictors of the Performance and the Difficulties in Physics among Senior Students in Mindanao State University-External Studies: A Proposed Intervention Program

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Abstract
This study was undertaken to determine the level performance and difficulties encountered by students in solving problems in high school physics and the factors related to these performance and difficulties. The student-respondents were the 300 secondary fourth year students chosen randomly from the MSU Community High School and the 16 Physics Teachers of all these schools during the School Year 2002-2003. A Descriptive-correlation design was used in this study with used of four (4) sets of structural questionnaires prepared by the researcher. Another instrument used was the teacher-made physics performance test. This was tried out to thirty senior high school students who were not included as respondents in MSU-Marantao Community High School. Richard-Kuderson (KR-20) formula was utilized to compute for the reliability coefficient of the instrument, which was found out that the instrument was reliable and valid (078).The Standardized Habits and Attitudes Test was used to determine the study habits of the student-respondents and the validated mathematics readiness test to measure mathematical readiness of the students. Stattisitacl computations were done on the computer STATISTIX 3.1 version package. Based on data analysis results revealed that 1) majority of the student-respondents were females, 16 years old, with parents' monthly income between P5,000.00 to P9,000.00 , with low average ratings on study habits, very ready on the fourth fundamental operations. 2) Majority of the Physics teachers are BS/BSE graduates with specialization in Science, were perceived by students to have good knowledge about Physics, have taught between 5-10 years. 3) Students found Physics as moderately difficult and their performance is categorized as average. 4) There is very low correlation between the predictor variables and performance in Physics, with only 12% of the predictor variables significant to students' difficulties and performance in Physics. For these results, it is recommended that teachers must improve their methods and techniques in teaching physics to make it more interesting and appealing to the students. They should motivate students to learn more by relating physics concepts to practical situations and learner's experience. They should also check students' solutions to the problem sets and see to it that students develop the cognitive skills as the exercises are done. They should also give exercises and activities related to the topic that would make students enjoy the subject.

Keywords: predictors of performance, difficulties in physics, intervention program

Introduction

Physics is always considered by many students as a difficult subject. Performing an experiment with expensive materials needed, and then the actual process to the analysis, interpretation and conclusion of the experiment is forever a waterloo to many students. But this difficulty of some students if not everybody in physics is not permanent. These changes brought about by accelerated modernization resulted in exhaustive review, reevaluation and corresponding redirection of the long range goals and objectives of science education. Recent developments reveal a number of vitally important movements indicative of urgent shift towards heightened attention regarding clearness thinking and learning instructional methods and strategies and curricular improvement.

A science teacher can choose from the different strategies/approaches that have been tried and proved effective. In presenting a science lesson, the following can be utilized: Expository method, discussion, asking questions, demonstration, problem-solving, and the guided discovery. Others are the concept mapping, multilevel teaching, mentoring, micro-teaching, using media and organizing science learning centers. These trends in science education are in consonance with the 1987 Philippine Constitution which provides the legal basis of education in the country particularly Article XIV which is primary concerned on Education, Science and Technology, arts and culture and Sports. It is the DepEd that pursues the mandate embodied in the Constitution as follows:

…*The State shall protect and promote the right of all citizens to qualify education at all levels and shall take appropriate steps to make such education accessible to all*…

Educational Act of 1982 (Batas Pambansa Blg. 232) applies to both private and public schools in all levels of the entire educational system. This Act provides that the basic policy of the State is to establish and maintain a complete adequate and integrated system of education relevant to the goals of national development which are to achieve and maintain an accelerating rate of economic development and social progress, assure the maximum participation of all people in the attainment and enjoyment of such growth, and achieve and strengthen national unity and consciousness and preserve, develop and promote desirable cultural, moral and spiritual values in a changing world. The Act further states that towards the realization of these objectives and pursuant to the Constitution, all educational institutions shall aim to inculcate love of country, teach the duties of citizenship and develop moral character, personal discipline, and scientific, technological, and vocational efficiency.

Many students still pass through their high school science subjects without a proper understanding of the most common basic and important concepts that these subjects intended to teach. Oftentimes, these students experience serious learning difficulties in physics than in other subjects. The very mention of the word physics is enough to make the students think of long, cruel examinations and abstract terms such as relativity and trajectory that the subjects often met with hostility. It is because of the perception that physics is so difficult that students often lose their interest in the subject and instead turn their interest in the subjects they perceive to be easier (Lawrenz, 1976, as cited by Peyrera, 1989). It is a paradox then that student seems to lose interest in science in this decade when scientific advances are unparalleled in the history of mankind (Trowbridge, 1986).

One of the purpose of high school physics, according to Talisayon (1992), is the pre-professional preparation of the young people going into science and to increase the scientific literacy of the general citizenry. The Philippines would profit much from a citizenry who have a proper understanding of science and what it can do to alleviate man's living conditions. Yet, the continuing dislike of students to science subjects particularly physics depletes our chance to utilize the good things that science has to offer. It also makes the time, money and effort spent by the students in studying less profitable. How can these students be helped? How can their interest in physics be gained? Many are proposing scholarships or special programs to attract students into taking physics courses. Some call for better facilities and academically qualified teachers. Many call for incentives and other benefits which motivate students to study physics. Unfortunately, only few respond to this call and the correctives and incentives offered do not totally answer the fundamental issues.

The issue is why do students lose interest in physics? Why do they perceive it as difficult? What aspects of physics are difficult for the students? What other factors affect this learning difficulty? The answers to these queries will enlighten the mentors on how to teach the subject better and to focus their attention to the learning difficulties encountered by students in learning physics. Hence, this investigation.

Method

The Respondents of the Study

The eleven secondary schools of the MSU-External Studies contributed the respondents of this study. Specifically, the respondents were the graduating students of the mentioned schools of Lanao del Sur for the School Year 2002-2003. This investigation employed the unrestricted random sampling with the help of the Sloven's formula (Ferguson, 1981).

Although there are schools located at Misamis Occidental and Zamboanga del Sur, the researcher opted for the Community High Schools in Lanao del Sur since the four schools are located in a far place and the peace situation is still a question for travelers. Besides, the researcher herself is a teacher and her absence from her classes just to field the questionnaires entails time, thus depriving the students to learn more during her absence since no one can take her place to teach Physics.

Statistical tools Used

In order to establish the reliability of the physics performance test, reliability coefficient was computed using the Richard Kuderson (KR-20) formula. Frequencies of correct responses were considered and used to compute the reliability coefficient. Statistical computations of the data gathered from the study were done through the use of the Statistics 3.1 version computer package. All hypothesis were at $\propto=0.05$.

Research Instruments

There were four (4) sets of structured questionnaires prepared by the researcher in order to gather data on factor correlates. The first structured questionnaire for the students was designed to elicit information on the respondents' age, sex, and family income. The next was the

difficulties in Physics subject. The third one was a structured questionnaire for student-respondents to get their perception n the physics knowledge of their physics teacher. And the last one was a structured questionnaire for physics teacher-respondents to get their educational qualifications, number of years in teaching physics and the number of years in the teaching profession.

A teacher-made physics performance test was prepared, corrected by an expert in physics and finally approved by the adviser. It was tried out to thirty (30) students of MSU-Marantao who were not included as respondents. Richard-Kuderson (KR-20) formula was utilized to compute for the reliability coefficient, which is 0.78. This coefficient indicated that the test is valid. Two weeks after the 3rd grading period (February to March, 2002) the physics performance or achievement test and other tests were administered to the different schools chosen as samples of this study.

Standardized Mental Ability Test made use the Purdue Non-language Test (PNLT) was also used as research instrument. It is a research instrument to measure the mental ability of persons. Form B of this test was used. Constructed by Purdue University, USA, the test has 48 items. Each item has five geometric designs corresponding to A, B, C, D, E. The subject was asked to choose the design which is different from the others and was asked to reflect his choice on a separate answer sheet. The test measures the accuracy of the perceptual discriminations, as well as perception of relationships. The respondents were given 25 minutes to work out the whole test. The raw scores corresponding to the correct answers were transformed into percentile rank for easy interpretation.

The rationale for the use of Non-Language Test is to assess the general mental ability of the respondents and to rule out one significant parameter along which culture varies with language. This is relevant to cross-cultural testing. The use of English by a non-English speaking subject makes a foreign-based test actually biased. Hence, the use of geometric designs which are being assumed to be universal to substitute for verbal English language content of the test for mental ability. The researcher sought permission from the Division of Student Affairs to authorize person in the field to assist the researcher to conduct the said test.

Another instrument that was used in this study was the Standardized Study Habits and Attitudes (SSHA) questionnaire. This was prepared by William F. Brown and Wayne H. Holtman which includes attitudes. SSHA is easy to administer to measure methods, motivation or studying certain study habits and towards scholastic activities, which are important in the classroom. The following are the reason of using this: (1) to identify students whose study habits and attitudes and thus more fully realized their best potentialities. This test was composed of 100 items. Every answer that was chosen by the respondent was scored using the five-point scale (almost always = 5; generally = 4; frequently =3; sometimes= 2; rarely =1). A validated Mathematics Readiness Test adapted from Dr. Sani (2001) was secured to measure product readiness of the student-respondents in Mathematics.

Data Gathering Procedure

Approval from the Office of the Assistant Vice Chancellor for Academic Affairs (MSU-External Studies) was sought (Appendix A) in order to administer series of tests to the different secondary units of the External Studies around the province of Lanao del Sur. The aforementioned approval was then used to support subsequent permission requests from the principals of the respondent schools in the distribution of the questionnaires to the students and to physics

teacher. With the assistance of the Principal and Guidance Counselor and some teachers of each respective school, the researcher personally administered the different sets of questionnaires. Those far distant schools like MSU-Malabang and MSU-Wao, only the principals were earnestly requested to administer the tests. The test were conducted after the third grading period during the months of February to March, SY 2002-2003. The questionnaires for Physics Performance Test, Mental Ability Test, Mathematics Readiness Test and Difficulties in Physics were retrieved and brought home by the researcher right after the tests were given. To give ample time for the respondents to answer the other questionnaires such as student profile, teacher profile, survey on student study habit and attitude and perceived knowledge by the students to their physics teacher the responsibility left to the Principal (upon request) for retrieval and after a week be brought to the Office of the External Studies, MSU, Marawi City. The researcher then gathered the questionnaires from the said office.

Findings

From the data gathered, the following are the findings:

1. Majority (66%) of the student-respondents are females; many (36.7%) of them are 16 years old; and majority (56.33%) of their parents received a monthly income of Php 5,000.00 to Php 9,999.00. In study habits and attitudes, the respondents have a low-average rating; the students obtained an average level in mental ability and students are very ready in the four fundamental operations as to mathematics readiness.

2. In terms of educational qualifications, majority (56.25%) of the physics teachers are BS / BSE graduates with science as their field of specification; majority (63.5%) of them have rendered services in teaching physics for 5-10 years; and as perceived by the students, the physics teachers were very good in their knowledge about physics.
3. As to the level of students' performance in physics, an average performance was obtained by them, although they found physics subject as moderately difficult.
4. The students found difficulty in solving problems in physics concepts. The topic on electricity ranked first among other difficulties in the different areas, the topic on wave ranked the second, and an S.D. of 1.3913; the third in rank was the topic on energy, and the last was the topic on speed. There is very low and low correlations between the predictor variables and the difficulties and performance of students in physics.
5. There is very low and low correlation between the predictor variables and the difficulties and performance of the students in physics.
6. Not all of the independent variables significantly predict the physics performance and the difficulties of the senior students. Only 5% of the predictor variables are significant to the students' difficulties and performance in physics.
7. Some of the predictor variables such as the number of years in physics teaching, the number of years in teaching profession and the student's family income and others weak such as teacher's educational attainment, student's sex, age, etc. as indicated in the adjusted R^2 which was 0.021.
8. An intervention program is being proposed from the findings of the study.

Descriptive statistics

Table 1 provides the sampling matrix of the study.

Table 1. SAMPLING MATRIX

MSU-External Community High School	No. of Senior Students			No. of Respondents			Percentage
	Male	Female	Total	Male	Female	Total	%
Balindong	45	61	106	17	25	42	14.00
Binidayan	31	38	69	13	15	28	9.33
Malabang	24	57	81	10	22	32	10.67
Marantao	10	37	47	4	14	18	6.00
Masiu	11	30	41	4	12	16	5033
Saguiaran	16	51	67	6	20	26	8.67
Siawadatu	17	28	45	7	10	17	5.67
Tamparan	16	25	41	6	10	16	5.33
Taraka	10	25	35	4	9	13	4.33
Tugaya	21	60	81	8	23	31	10.33
Wao	59	98	157	23	38	61	20.33
TOTAL	260	510	770	102	198	300	100.00

Inferential Statistics

Table 2. Frequency and Percentage Distribution of the Student-Respondents as to Personal Profile

Category	Frequency	Percentage	Mean
Sex			
Male	102	34.00	**1.6**
Female	198	66.00	
Total	300	100.00	
AGE			
• 15	16	53.00	
• 16	110	36.70	16.76
• 17	108	36.00	
• 18	66	22.00	
TOTAL	300	100.00	
FAMILY INCOME			
15,000 – 25,000	38	12.67	
10,000 – 14,999	61	20.33	8.74
5,000 – 9,999	169	56.33	
1,000 – 4,999	32	10.67	

Table 3. Frequency and Percentage Distribution of the Student-Respondent as to Mental ability

Mental Ability	Frequency	Percentage	Mean
Superior	2	0.67	
Above Average	18	6.00	
Average	132	44.00	**3.2**
Below Average	124	41.33	
Poor	24	8.00	
TOTAL	300	100.00	

SCORES	QUALITATIVE DESCRIPTION SCALING	
95-100	Superior	4.21 - 5.00
80-94	Above-Average	3.41 - 4.20
50-79	Average	2.61 - 3.40
30-49	Below-Average	1.81 - 2.60
01-29	Poor	1.00 - 1.80

Table 4. Profile in Mathematics Readiness of Students

Areas	Mean	SD	Qualitative Description	Rank
Problem Solving				
1. 4 fundamental operation	2.35	0.6341	Very Ready	1
2. Fraction	1.65	0.7883	Ready	3
3. Percentage	1.66	0.7962	Moderately Ready	2

SCALING	SCORES	QUALITATIVE DESCRIPTION
2.34 - 3.00	100 - 120	- Very Ready
1.66 - 2.33	50 - 99	- Moderately Ready
1.00 - 1.65	1 - 49	- Not Ready

Table 5. Profile on Study Habits and Attitudes of Students

Scales	Percentile Rank	Qualitative Description
Delay Avoidance	24.36	Very Low
Work Methods	23.84	Very Low
Teacher Approval	17.92	Very Low
Education Acceptance	16.73	Very Low
Study Habits	24.10	Very Low
Study Attitudes	17.32	Very Low
Study Orientation	27.50	Low Average

Percentile Rank	Qualitative Description
01-25 %	Very Low Study Habits and Attitudes
26-50 %	Low Average Study Habits and Attitudes
51-75 %	High Average Study Habits and Attitudes
76-100 %	Very High Study Habits and Attitudes

Table 6. Frequency and Percentage Distribution of Physics Teachers as to their Profile (N=16)

Educational Attainment	Frequency	Percentage
BS/BSE Science	9	56.25%
BS/BSE Non-Science	2	12.50%
MA in Science	1	6.25%
MA in Non-Science	1	6.25%
MA in Science (CAR)	1	6.25%
Ph.D. in Non-Science (Units Only)	1	6.25%
Ph. D. in Science (CAR)	1	6.25%
No. of Years Teaching Physics		
1-5 years	4	25.00%
6-10 years	10	63.50%
11-20 years	2	12.50%
No. of Years in the Teaching Profession		
1-5 years	4	25.00%
6-10 years	8	50.00%
11-20 years	4	25.00%

Table 7. Students' Perception towards Teacher's Knowledge In Physics

Perceived Teacher' Knowledge	Frequency	Percentage (%)	Mean	SD	Qualitative Description
Very Good (3.70-4.00)	91	30.33			
Good (2.80-3.69)	85	28.33	2.73	1.46	Fair
Fair (1.90-2.79)	75	25.00			
Poor (1.00-1.89)	49	16.33			
Total	300	100.00			

Table 8. Mean Rating of Student-Respondents Difficulties in Physics

Topics	Mean	SD	Qualitative Description	Rank
Speed	2.94	1.3134	Moderately Difficult	4
Energy	2.95	1.4013	Moderately Difficult	3
Wave	3.06	1.3913	Moderately Difficult	2
Electricity	3.19	1.3578	Moderately Difficult	1

Scaling:

4.21-5.00	Extremely Difficult
3.41-4.20	Much Difficult
2.61-3.40	Moderately Difficult
1.81-2.60	Slightly Difficult
1.00-1.80	Less Difficult

Table 9. Level of Performance of Student-Respondents in Physics

Score	F	Percentage	Mean	SD	DR
0 – 7	56	18.67	1.86	0.4677	
9 – 15	229	76.33			Below Average
16 – 23	15	5.00			
24 – 31	0	0.00			
32 - 39	0	0.00			
TOTAL	300	100.00			

Scaling:

32-39	-	90	-	4.21-5.00	-	Outstanding
24-31	-	85	-	3.41-4.20	-	Above Average
16-23	-	80	-	2.61-3.4	-	Average
8-15	-	75	-	1.81-2.60	-	Below Average
0-7	-	70	-	1.00-1.80	-	Poor

Table 10. Summary of Results of the Physics Performance Test

Concepts	No. of Items	Mean Score	SD	Minimum	Maximum
Speed	11	4.45	1.81	1	10
Energy	11	4.10	1.52	1	9
Waves	8	2.29	1.29	1	8
Electricity	9	3.20	1.39	1	6
Total	**39**	Grand Mean 3.39			

Scores	Scale	Qualitative Description
39—32	4.21-5.00	Outstanding / Superior
31—24	3.41-4.20	Above Average
23—16	2.61-3.40	Average
15—8	1.81-2.60	Below Average
7—0	1.00-1.8	Poor

Table 11. Percent Difficulty of the Physics Performance Test Items by Topics and by Cognitive Skills

Cognitive Skills	T O P I C				Average Difficulty of the Skill
	Speed	Energy	Waves	Electricity	
1. Identifying the given data	28.4	14.8	40.8	14.2	24.6
2. Recalling important terminologies and concepts	64.5	68.6	40.8	52.1	56.1
3. Describing or explaining important laws, concepts, theories that will help explain the situation as described by the problem	57.4	50.3	72.7	71.0	62.8
4. Drawing Graphs that will help explain the condition	63.6	74.6	79.9	66.3	68.3
5. Determine the formula to be used considering the situation in the problem set	66.8	75.1	81.0	60.9	70.7
6. Answering what is asked in the problem by applying the formula or the relationship	47.9	69.8	84.6	86.4	73.4
7. Expressing quantities in correct units	27.8	42.0	72.0	68.0	52.5
8. Predicting the possible outcome if some alternatives of the conditions in the problem	56.8	68.2	90.5	50.9	66.6
Average difficulty of the topic	55.1	61.6	70.3	61.8	

Table 12. Correlation between Performance in Physics and Predictor Variables.

Predictor Variables	(r)	Analysis of r	Interpretation
Sex	0.027	VLC	Not significant
Age	0.009	VLC	Not significant
Monthly Family Income	0.150	VLC	Significant
Study Habits and Attitudes	0.090	VLC	Significant
Mental Ability	-0.69	HC	Not significant
Mathematics Readiness	-0.48	MC	Not significant
Educational Attainment of Teacher	0.51	MC	Not significant
Years of Teaching Physics	-0.086	VLC	Not significant
Years in Teaching Profession	0.086	VLC	Not significant
Perceived Knowledge of Teacher by the Students	-0.018	VLC	Not significant

Correlation Variables:

(+-) 0.00 to (+-) 0.20	-	Very Low Correlation (VLC)
(+-) 0.21 to (+-) 0.40	-	Low Correlation (LC)
(+-) 0.41 to (+-) 0.60	-	Moderate Correlation (MC)
(+-) 0.61 to (+-) 0.70	-	High Correlation (HC)
(+-) 0.71 to (+-) 0.99	-	Very High Correlation (VHC)

Table 13. Correlation between the Personal Profile of Students and Teachers and Difficulties of Students in Physics

Independent Variables	(r)	Analysis of r	Interpretation
Sex	0.037	VLC	Not significant
Age	0.093	VLC	Not significant
Monthly Family Income	-0.177	VLC	Significant
Study Habits and Attitudes	0.005	VLC	Significant
Mental Ability	0.021	VLC	Not significant
Mathematics Readiness	-0.002	VLC	Not significant
Educational Attainment of Teacher	-0.007	VLC	Not significant
Years of Teaching Physics	-0.181	VLC	Not significant
Years in Teaching Profession	0.053	VLC	Not significant
Perceived Knowledge of Teacher by the Students	-0.043	VLC	Not significant

Analysis of (r):

r from 0.00 to ±0.20	=	Very Low Correlation (VLC)
r from 0.21 to ±0.40	=	Low correlation (LC)
r from 0.41 to ±0.60	=	Moderate Correlation (MC)
r from 0.61 to ±0.70	=	High Correlation (HC)
r from 0.71 to ±0.99	=	Very High Correlation (VHC)

Table 14. A Regression Analysis on the Performance in Physics on Predictors

Predictor Variables	Coefficient	SE	T	P*	Interpretation
Sex	0.046	0.420	0.110	0.913	Insignificant
Age	0.076	0.234	0.323	0.747	Insignificant
Monthly Family Income	0.000	0.000	2.086	0.038	Significant
Study Habits and Attitudes	0.006	0.004	1.287	0.199	Insignificant
Mental Ability	-0.050	0.069	-0.725	0.469	Insignificant
Mathematics Readiness	-0.022	0.091	-0.242	0.809	Insignificant
Educational Attainment of Teacher	-0.015	0.475	-0.031	0.975	Insignificant
Years of Teaching Physics	-0.070	0.036	-1.190	0.057	Insignificant
Years in Teaching Profession	0.041	0.026	1.755	0.122	Insignificant
Perceived Knowledge of Teacher by the Students	-0.242	0.466	-0.519	0.604	Insignificant

Df	=	299
Overall, F	=	1.530
P value	=	0.128
Adjusted R^2	=	0.017
R^2	=	0.050
Level of significance	=	0.05

Table 15. Regression Analysis: Difficulty in Physics on Predictor Variables

Predictor Variables	Coefficient	SE	T	P*	Interpretation
Sex	0.073	0.047	1.539	0.125	Significant
Age	0.067	0.026	2.543	0.012	Significant
Monthly Family Income	-0.00002	0.00001	-3.74666	0.00022	Significant
Study Habits and Attitudes	0.0000	0.0000	0.497	0.620	Not Significant
Mental Ability	0.001	0.008	0.144	0.886	Not Significant
Mathematics Readiness	-0.002	0.010	-0.171	0.864	Not Significant
Educational Attainment of Teacher	-0.002	0.053	-0.030	0.976	Not Significant
Years of Teaching Physics	-0.017	0.004	-4.120	0.00005	Significant
Years in Teaching Profession	0.006	0.003	1.911	0.057	Not Significant
Perceived Knowledge of Teacher by the Students	-0.042	0.052	-0.796	0.427	Not Significant

Df	=	299
Overall F	=	3.659
P value	=	0.000129
Adjusted R^2	=	0.0082
R^2	=	0.112
Level of significance	=	0.05

Table 16. Regression Analysis: Performance and Difficulty in Physics on Predictor Variables

Predictor Variables	Coefficient	SE	T	P*	Interpretation
Sex	0.119	0.423	0.281	0.779	Not Significant
Age	0.142	0.236	0.605	0.546	Not Significant
Monthly Family Income	0.00008	0.00005	1.655	0.099	Not Significant
Study Habits and Attitudes	0.006	0.004	1.334	0.183	Not Significant
Mental Ability	-0.049	0.069	-0.704	0.482	Not Significant
Mathematics Readiness	-0.024	0.091	-0.259	0.796	Not Significant
Educational Attainment of Teacher	-0.017	0.478	-0.035	0.972	Not Significant
Years of Teaching Physics	-0.087	0.036	-2.357	0.019	Significant
Years in Teaching Profession	0.047	0.027	1.755	0.080	Not Significant
Perceived Knowledge of Teacher by the Students	-0.284	0.470	-0.605	0.546	Not Significant

Df	=	299
Overall F	=	1.626
P value	=	0.199
Adjusted R^2	=	0.021
R^2	=	0.053
Level of significance	=	0.05

Discussion

Table 2 discloses the sex of the student-respondents. As disclosed, there were 102 or 34.00 percent of the respondents who are male and 198 or 66.00 percent who were females. This data signify that majority (66%) of the respondents are females. This means that more females enrolled in their elementary education and this continues until their secondary education. The

finding of the study is consonant with the study of Orbita (2000) when he revealed that in the division of City Schools, Iligan City, there were 4, 019 females and 2,132 males enrolled in the fourth year public secondary schools of Iligan City SY 2000-2001. As to age, 110 or 36.7 percent were 16 years old; 108 or 36.00 percent were 17 years of age; and 16 or 5.3 percent of the respondents were 15 years of age.

The findings show that many (36.7%) of the student-respondents are 16 years old. This implies that the students belong to the puberty age. This age is known as the formal operation (12-adult) stage according to Piaget as cited by Cabaluna (2000) which is characterized by abstract and critical thinking. This means that the child can think logically about things existing only in his mind. He can formulate hypothesis, analyze, and synthesize ideas and evaluate variables.

In family monthly income, the table shows that 38 or 12.67 percent of the respondents' family received a monthly of Php 15,000.00 to Php 25,000.00. 61 or 20.33 percent received a monthly income of Php 10,000.00 to Php 14,999.00; 169 or 56.33 percent were receiving Php 5,000.00 to Php 9,999.00; and 32 or 10.67 percent were receiving Php 1,000.00 to Php 4,999.00.

These data signify that majority (56.33) of the respondents have a monthly income of Php 5,000.00 to Php 9,999.00. This implies that a typical family belongs to below poverty threshold that further means the income of the family is not sufficient for all their needs and surely this affects the study habits and academic performance of the students. Newman (2001) supported this concept when he opined that learners reared in the middle-class homes with well-educated parents will generally thrive from those who are likely to grow up in the lower class homes.

The mental ability test reveals that two (2) or 0.67 percent of the respondents belonged to the superior level; 18 or 6.00 percent were on the above average category; 132 or 44.00 percent were classified as average; 124 or 41.33 percent belonged to the below average category; and 24 or 8.00 percent were classified as poor in mental ability.

This data signify that the students are on the average level of mental ability as evidence by the MEAN which 3.20 and are described qualitatively as average. This means that many (44%) of the students are neither above average nor below average or poor. It further implies that the at least the students can comprehend what the lessons are. But then according to Bailey, et al., (1971) IQ's are not constant. As posited by them, IQ score is not indelibly carved in the brain at birth, but is instead a human quality that ebbs and flows as a result of environmental circumstances. This means that the IQ of the students might increase or decrease depending on how they develop it. It may continue to increase at least up to age fifty.

The result showed that in the four fundamental tests, the mean rating was 2.35 and described qualitatively as very ready; fraction test obtained a mean rating of 1.65 and a descriptive rating of ready; with a percentage area having a mean rating of 1.66 and a descriptive rating of moderately ready.

The findings infer that the students are very much ready in the four operations of arithmetic. This means that in addition, subtraction, multiplication, and division, the students have mastered its operation however low competence in the areas of fraction and percentage. This study conforms to the study of Abedin (1998) when she revealed that Lanao Province fourth year secondary public school students were low in their mathematics achievement.

As manifested, the score on six (6) subscales with corresponding percentile rank were described very low; Delay Avoidance, 24.36; Works Methods, 23.84; Teacher Approval, 17.92; Education Acceptance, 16.73; as Study Habits, 24.10.

In a nutshell, the respondents obtained a very low scores in study habits and attitudes in all subscales. This means that the respondents are not prompt in the completion of their assignments and projects, no system in studying, have negative attitudes toward their teacher's educational objective practices and requirements. But in sum the overall measure of the study habits and attitudes combined into study orientation garnered a percentile rank of 27.50 which is described as low average. The study of Granada (1988) supports the result of all the subscales but the overall result or the study orientation differs since the study obtained a low-average descriptive rating while that of Granada received a very low descriptive rating.

The findings signify that majority (63.50%) of the teachers in physics have already 6-10 years to vouch their credibility. This means that with this number of years in teaching physics, the teachers have already gained and exposed themselves to all sorts of problems in teaching physics and are able to find solutions and adjustments for a better and effective teaching. This is substantiated by Bargaza as cited by Lupdag (1984) when he pointed out that high scoring schools in the NSAT had more experienced teachers.

Further, finding infers that the teachers in physics have enough number of years in the teaching profession to face any adversity in teaching. As stressed by Lupdag (1984) observations show that teachers who have more teaching years back them up. Regardless of its effects however, every teaching brings to the classroom his teaching experiences, which could positively or adversely affect instruction.

The mean rating of the students' perceptions regarding the knowledge of their teachers in Physics was 2.73 described qualitatively as fair. This means that the teachers knowledge in Physics as perceived by the students are just fair, have enough knowledge to teach them. This result is reinforced by Caulawon's (2002) study when she revealed that the secondary students of Iligan City East High School perceived their teachers to have adequate knowledge in Mathematics and Science. The data signify that the student-respondents perceived electricity as their number one difficulty in Physics. This mean that they find a little bit difficult to make a graphical representation and concretization of the abstract topic electricity

The result manifests that the students are below average in their performance as evidence by the mean rating of 1.86 and an S.D. of 0.4677. The S.D.-measures of variability signifies that all the student-respondents are within the range, that of below average. Therefore, the student-respondents really find Physics as a difficult subject. To quantify difficulties encountered in solving problems in physics, the errors in the physics performance test counted. There were scores for every topic. The average percent difficulty to each topic represents the average proportion of respondents who were not able to answer the items correctly. Items with percentages greater than 60% are considered difficult. Equally difficult for the students are the problems in electricity. The average difficulty in this topic is 61.8%. Very often, energy and electricity are interchanged in colloquial language. The students encountered the most difficulty in problems on waves as implied by the 70.3% difficulty level. It is highest of the four average difficulty levels. Problems on more advanced concepts were focused by the respondents to be more difficult to solve.

Table 12 shows the simple correlation / association between the performance in physics of the senior students and the predictor variables. It reveals that all correlation values were very low. But when tested at 0.05 level of significance, the three correlation coefficients of the students' monthly family income, students' study habits and attitudes and the teacher's number of years in the teaching profession came out to be significant. This indicates that the higher the monthly family income of the students the better the performance in Physics. Also, students' regular study habits and attitudes make students' performance in physics better as supported by the study of Fisher and Lipson (1986). He mentioned that knowledge is not simply absorbed from a book or lecture. Each science student constructs his or her own of version of concepts, and the construction is informed at every stage of student's overall conceptual model or worldview. Other factors correlated to the performance in physics may have intervened. These factors were not considered in the framework of the study. They could be the subject of another study.

As reflected in Table 13, all students' profile obtained a very low correlation. However, when these predictors were tested at 0.05 level, the students' age and the teacher's number of years in the teaching profession evolved to be significant. This means that these two variables are good predictors of difficulty in physics. However, student's variables such as sex, family income, study habits and attitude, mental ability and mathematics readiness are not predictors of student's difficulty in physics.

In teachers' professional profile, the variables such as educational attainment, the number of years in teaching profession, and the perceived knowledge of the teacher by the students were analyzed to have a low and insignificant correlation with the dependent variable difficulty in physics.

In particular, in order to be included in the regression model, the variable must met the 0.05 level for entry. This further signifies that only 1.70 percent of the relationship is explained by the predictor variable used. The remaining 98.30 percent signifies that there are other variables or factors that contribute to the significance of the relationships aside from the mentioned or enumerated predictors of this study.

As to the strength of the combination of the combination of the correlate explaining the performance of the students, the Adjusted R^2 revealed a 0.017 result, which signifies that the combination of the predictors with the performance is very weak. It did not come up the expected result, which is 0.8. A 0.8 correlation signifies a strong effect.

As gleaned from Table 15, there were only three correlates that were predictors of the difficulty in physics. The multiple correlation is a versatile tool in measuring the amount of combination correlates in the explanation of the dependent variable difficulty in physics. To know the total contribution of the correlates of the investigation, the multiple correlation stepwise regression analysis was employed.

The obtained multiple correlation value was 0.112. This value indicates that the coefficient of multiple determination is 0.112 or 11.2% accurate in explaining the contribution of the correlates in explaining the difficulty in physics is so low that 88.8% remains unaccounted in the explanation of the total difficulty of the students. The analysis of the data further shows that most of the hypotheses were not rejected.

The results of the study disclosed that there were only four (4) independent variables of difficulty in physics namely: student's sex, the age of the senior students, the monthly family income of the students and the number of years in teaching in physics of the teacher.

In Table 16, the linear regression analysis and the multiple correlation show that there was a very low correlation between the senior student's performance and difficulty in physics and the predictor variables both student's and teacher's profiles. Only the teacher's number of teaching in physics served as a good predictor of the sum of the dependent variables performance and difficulty in physics.

The obtained multiple correlation value was 0.053. This means that the coefficient of multiple determination is 5.3% accurate in explaining the dependent variable
(Performance + Difficulty). This is very low. There is 94.3% coefficient of multiple non-determination.

The results of the investigation disclosed that there were only one (1) predictor of senior student's performance and difficulty in physics. This predictor is the number of years in teaching in physics. The rest of the independent variables such as student's sex, age, monthly family income, study habits and attitudes, mental ability, mathematics readiness, teacher's educational attainment, years in teaching physics, years in the teaching profession and knowledge perceived by the students were found out to be poor predictors of the students' performance and difficulty in physics.

Conclusions

A teacher in physics is typically a BS / BSE graduate major in science, perceived by the students to be very good in their knowledge in physics, has 5-10 years of teaching physics in their credit and has been in the teaching profession for 6-10 years. On the null hypotheses results on based conclusion, a low correlation existed between the independent variables like sex, age, family income, study habits and attitudes, mental ability, readiness in mathematics, teacher's educational attainment, knowledge in physics as perceived by the students, number of years in teaching physics and the number of years in the teaching profession and the difficulties and performance of students in physics. Majority of the variables have no significant relationship between the student personal profile and their performance in physics. Only the student's family income, student's study habits and attitudes are significant. Only the physics teaching profession of the teachers has the significant relationship between the teachers' profession profile and the students' performance in physics.

Among the teacher factors, only the number of years in teaching profession was found out to be significantly correlated with students' difficulty in physics. Null hypotheses concerning the independent variables failed to be accepted since each of the independent variables does not significantly predict the performance and difficulties of senior high school in physics.

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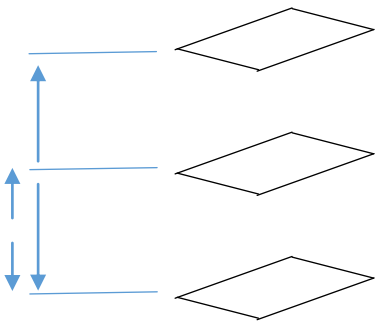
Appendix I

I.SPEED

A Toyota and an FX are driven on the same 130.0 km trip. The Toyota travels at 80.0 km/h all the time. The FX starts at the same time, 95.0 km/h but the driver stops for (10) minutes after he has travelled half an hour. Which car is the first to arrive at the destination?
Which of the following data is NOT given in the problem?
How can you compute for the car's speed?
Which is NOT true about the Toyota's motion?
Which is the correct graph of the FX's trip?
Which formula could be used to determine the time the two cars travelled?
How long did the Toyota travel the 130 km trip?
How long did the FX travel the 130 km trip?
Which car is the first to arrive at the destination and by how many minutes ahead of the other car?
Without converting any unit, which is the correct unit for the speed of cars?
Suppose the driver of the FX did not stop for 10 minutes, which car will strive first and by how many minutes ahead of the other?

II. ENERGY

An object of mass 2.0 kg is released from rest at a height of 10 m. Assume a=10m/s.
Solve for its energy at the specified position.



Which of the following data is NOT given in the problem?
When the ball is at its highest position A, its kinetic energy is equal to?
At any instant, the system's total energy is?
Which of the following graphs represent the total energy possessed by the body at any height?
Which is the correct formula for solving for the potential energy of the object at position A?
Which is the correct formula for getting kinetic energy of the object?
What is the gravitational potential energy of the object at position A?
What is the kinetic energy of the object at position C?
Which of the following is a correct unit of energy?
What will be its kinetic energy if it is at position B?

III. WAVES

Refer to the diagram which shows as instantaneous picture of a wave. It takes A 3s to move to position D. What is the frequency of the wave?

Which of the following data is NOT given in the problem?

It is the distance from A to C.

When water waves pass from a deep to shallow portion, which of the following does NOT change?

If the wave moves from deep to shallow, what diagram shows the correct direction refracted waves in relation to the incident wave?

What is the velocity of the propagating wave?

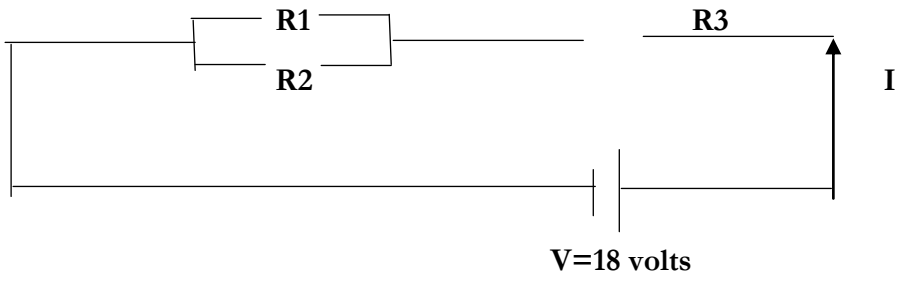
If the crest A takes 3s to move to position D, what is the frequency of the wave?

Which unit correctly expresses the wavelength of the wave?

In a certain medium, the speed of the wave is constant. If the frequency of the wave is doubled, their wavelength will be?

III. ELECTRICITY

Given an electric circuit, what is the total current of the whole combination?



Which of the following data is NOT given in the problem

Which resistors are in parallel connection?

Three resistors, a dry cell and connecting wires are used in this electric circuit, which will supply the energy?

What of the following graphs correctly relates between voltage V and the current I?

Which correctly describes the relation among voltage, current and resistor?

What is the total resistance for R1 and R2?

What is the total current of the whole combination?

If the voltage in a circuit is not changed but the total resistance is doubled, what will happen to the current?