FACTORS INFLUENCING THE ACADEMIC PERFORMANCE IN PHYSICS OF DMMMSU-MLUC LABORATORY HIGH SCHOOL FOURTH YEAR STUDENTS S.Y. 2011-2012

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ABSTRACT

This study focused on the investigation on the predictors of the academic performance in Physics of Don Mariano Marcos Memorial State University Mid La Union Campus (DMMMSU-MLUC) Laboratory High School Fourth Year Students for the School Year 2011-2012. Factors such as family, student, school and teacher factors were correlated to academic performance. Significant relationships to academic performance in Physics occurred for the four factors namely, Grade Point Average (GPA) in Math, GPA in English, attitude towards Physics, and study habits. The results imply that students’ performance in Physics will be higher if they perform better in English and Mathematics; if they show positive attitude towards Physics; and if they possess good study habits. Among the factors, GPA in Math had the best influence to academic performance in Physics.

KEYWORDS: performance, factor, predictor

INTRODUCTION

Learning (represented by academic performance in this study) of students is not confined in a closed space. Different factors bombard this learning which can either enhance or undermine it. These include family factors, student-related factors, school-related factors and teacher factors.

Different theories can explain the learning behavior of learners that may affect their academic performance.

According to Cherry (2012, April 12), behaviorism, also known as behavioral psychology, is a theory of learning based upon the idea that all behaviors are acquired
through conditioning. Conditioning occurs through interaction with the environment. Behaviorists believe that an individual’s responses to environmental stimuli shape his/her behaviors. According to behaviorism, behavior can be studied in a systematic and observable manner with no consideration of internal mental states. This school of thought suggests that only observable behaviors should be studied, since internal states such as cognitions, emotions and moods are too subjective.

Learning Theories.com (2012, April 12), exemplifies on Vygotsky’s Social Development Theory that social interaction plays a fundamental role in the process of cognitive development. Such occurs first between the child and other people (inter-psychological) and then inside the child (intra-psychological). Other people can be conceptualized as the “The More Knowledgeable Other (MKO)”. The MKO refers to anyone who has a better understanding or a higher ability level than the learner, with respect to a particular task, process, or concept. The MKO is normally thought of as being a teacher, and could also be peers.

The Learner-Centered Psychological Principles of Learning (from http://www.sp.uconn.edu/~myoung/KEYS/14prins.html, April 12, 2012) emphasize four major factors to student-centered instruction: (1) Cognitive and Metacognitive, (2) Motivational and Emotional, (3) Developmental and Social, and (4) Individual Differences.

According to the Cognitive and Metacognitive Factors, teachers play a major role in the child’s learning. Culture can influence many aspects of learning and education, such as motivation, learning, and ways of thinking. Technology and instructional practices need to be appropriate for children’s level of knowledge, ability and learning strategies. The classroom environment, especially whether or not it is nurturing, can significantly influence learning.

Motivational and Emotional Factors emphasize that intrinsic motivation is enhanced when children perceive tasks as interesting, personally relevant, meaningful, at an appropriate level for the child’s ability, and on which they believe they can succeed.

The Developmental and Social Factors emphasize that learning is influenced by social interactions, interpersonal relationships, and communication with others. Learning is often enhanced when children have an opportunity to interact with and collaborate with others on instructional tasks. In these situations, children have opportunities for perspective taking and reflective thinking that can enhance their self-esteem and development. Quality interpersonal relationships can provide trust and caring that increase children’s sense of belonging, self-respect, self-acceptance, and produce a positive learning climate. Parents, teachers, and peers are very important people in the child’s social world and their relationships with the child can either enhance or undermine the child’s learning.

According to Individual Differences Factors, children have different strategies, approaches, and capabilities for learning that are the result of experience and heredity. Children are born with and develop their capabilities and talents. And through experience, they acquire preferences for how they like to learn and the pace at which they learn. Learning is more effective when differences in children’s linguistic, cultural, and social backgrounds are taken into account. The same basic principles of
learning, motivation, and effective instruction apply to all children. It is important for teachers to be sensitive to these variations and create learning environments that take these variations into account.

Setting appropriately high and challenging standards, as well as assessing the learner and learning progress, are integral parts of the learning process. Effective learning takes place when children are challenged to work toward appropriately high goals. Thus, appraisal of children’s cognitive strengths and weaknesses, as well as current knowledge and skills, is an important aspect of choosing instructional materials that are optimal level of difficulty.

Workman (2012, April 12) said that attitude can alter every aspect of a person’s life, including their education. Student attitudes on learning determine their ability and willingness to learn. If negative attitudes are not altered, a student is unlikely to continue his education beyond what is required. Changing students' negative attitudes towards learning is a process that involves determining the factors driving the attitude and using this information to bring about change.

According to Lumsden (1994), student motivation naturally has to do with students' desire to participate in the learning process. But it also concerns the reasons or goals that underlie their involvement or noninvolvement in academic activities. Although students may be equally motivated to perform a task, the sources of their motivation may differ. A student who is INTRINSICALLY motivated undertakes an activity "for its own sake, for the enjoyment it provides, the learning it permits, or the feelings of accomplishment it evokes" (Mark Lepper 1988). An EXTRINSICALLY motivated student performs "IN ORDER TO obtain some reward or avoid some punishment external to the activity itself," such as grades, stickers, or teacher approval (Lepper). Motivation to learn is a competence acquired "through general experience but stimulated most directly through modelling, communication of expectations, and direct instruction or socialization by significant others (especially parents and teachers)." Children's home environment shapes the initial constellation of attitudes they develop toward learning. When parents nurture their children's natural curiosity about the world by welcoming their questions, encouraging exploration, and familiarizing them with resources that can enlarge their world, they are giving their children the message that learning is worthwhile and frequently fun and satisfying.

With the presentation of the different theories above, determining the factors that greatly influence the performance of students will pave the way for better learning – for better quality of education, thus the study was conducted.

**Statement of the Problem**

The study determined the factor or factors influencing the academic performance in Physics of DMMMSU-MLUC Laboratory High School fourth year students for the School Year 2011-2012.

Specifically, it sought answers to the following questions:

1. What are the characteristics of the fourth year students with regards to the following:
a. family-related factors (educational attainment of parents, occupation of parents, family income and parent’s learning support)
   b. student factors (gender, GPA in Mathematics, GPA in English, attitude towards Physics, study habits, and peer influence)
   c. school-related factors (physical facilities and library services)?

2. What is the level of performance of the teacher with regards to teaching effectiveness as to commitment, knowledge of subject, teaching for independent learning and management of learning?

3. What is the level of academic performance of the fourth year high school students in Physics?

4. Is there a significant relationship between the academic performance of the students and the family-related factors, student factors, school-related factors and teacher factors?
   4.1 Which among the factors would greatly influence the academic performance in Physics of the fourth year Laboratory High School students?

**METHODOLOGY**

This study employed the descriptive-correlational research methods. Descriptive since the description of the factors and the level of performance of fourth year students were determined. Correlational since relationships between the factors and the academic performance of the respondents were considered.

The population of the study was the 36 fourth year Laboratory High School students for the School Year 2011-2012. Sampling procedures were employed to determine the number and specific respondents of the study. Specifically, a sample of 33 students was computed using the Lynch Formula. To determine the 33 student-respondents, simple random sampling was employed using the Fishbowl Technique.

Data for family related factors, student factors, school related factors and teacher factors (questions were based on the performance evaluation form used by DMMMSU) were gathered using a questionnaire. Study habit and physical facilities questions were adopted from the study of Bucsit (2001). The rest of the questions in the questionnaire were adopted from the study of Aspiras (2005). GPA in Mathematics and GPA in English were taken from the respondents’ permanent record.

Frequency count and percentages coupled with weighted mean were commonly the tools for data analysis.

Pearson product moment correlation coefficient (Pearson r) was used to determine the nature of relationship between the academic performance of the students and the four different factors. To identify if the relationship is significant, t-test for correlation analysis was used. Multiple Regression was used if there were factors that affect academic performance in Physics. Stepwise Regression technique was used to determine which among the factors would greatly influence the academic performance in Physics of the fourth year Laboratory High School students.
RESULTS AND DISCUSSION

Characteristics of the Respondents

I. Family-Related Factors

As to educational attainment of parents, most of the respondents’ parents were college graduate. For the fathers of the respondents, nine percent were high school graduate, 33 percent were college undergraduate/vocational, 52 percent were college graduate and six percent were post graduate. For the mothers of the respondents, 21 percent were high school graduate, nine percent were college undergraduate/vocational, and 70 percent were college graduate. There were more mothers than fathers who were college graduate.

As to occupation of parents, out of the 33 fathers of the respondents, six were government employees, five were drivers, four were businessmen, four were with no work, three were welders, three were farmers/carpenters, two were bookkeepers/bank officers, two were Overseas Filipino Workers (OFW), two were supervisors, and two were electricians. Most of the respondents’ mothers were housekeepers. Out of 33, 14 were housekeepers, eight were government employees, six were businesswomen, three were teachers and one each for bookkeeping and OFW.

As to monthly family gross income, 18 percent (18%) had a family gross income of P5,000 and below, 21 percent had P5,000-P9,999, 27 percent had P10,000-P14,999, three percent had P15,000-P19,999 and 30 percent had P20,000 and above. Since most of the respondents’ parents were working, the monthly family gross income was contributed both by the father and the mother.

The indicator which showed the most learning support from the parents to the respondents was “They motivate me to go to school”. This means that parents were giving priority and importance to the education of their children. The indicator with the lowest mean was “They help me make my physics assignments, projects at my most convenient time particularly in the evening”. Factors such as being busy or the students do not really seek help from their parents can explain this. The overall mean of 3.42 with a descriptive rating of “Much Supportive” showed that, in general, parents supported their children in their studies.

II. Student-Related Factors

Student-related factors include gender, GPA in Math and in English, attitude towards Physics, study habits, and peer influence.

Among the 33 fourth year high school students for the SY 2011-2012, 16 were female and 17 were male.

As to GPA in Math, no one failed and had exactly a passing rate. Forty-eight percent (48%) had satisfactory rating, 30 percent had good rating, 21 percent had very good rating, and none had excellent rating.

As to GPA in English, no one had a failing rate. Three percent (3%) had exactly a passing rating, 48% had satisfactory rating, 27 percent had good rating, 18 percent had very good rating, and three percent had excellent rating.
Attitude refers to thoughts or feelings of interest towards a certain object, phenomenon or event. The respondents strongly agree that “Physics is as important as any other subject”. This can be explained by the fact that the respondents really feel the essence of Physics in their everyday life. This is in accordance to the Theory of Reasoned Action as stated by the The European Peer Training Organisation (2012, April 13). According to this theory, the intention of a person to act based on a recommended behavior is determined by the person’s attitudes towards this behavior and his or her belief about the consequences of the behavior. Overall, the respondents agree to the different indicators of attitude towards Physics.

Study habits are the practices done by any student to keep pace on his/her studies. Studying beyond what the teacher gives to the students is one of the best learning practices a student should do. In contrast, further reading in the Physics topics was seldom done by the respondents. In general, indicators of study habits were sometimes practiced by the respondents. This means that most of the respondents really do not have the initiative to help themselves to study Physics.

The respondents were oftentimes influenced by their peer. This is in accordance to Vygotsky’s Social Constructivism Theory. According to Vygotsky from Learning Theories.com (2012, April 12), social interaction plays a fundamental role in the process of cognitive development, first, between people (inter-psychological) which could be peers and then inside the child (intra-psychological).

III. School Related Factors

School-related factors include physical facilities and library services. According to Farlex (2012, May 20), on the Free Dictionary.com, a facility is a building or place that provides a particular service. Facilities are something created to serve a particular function. School physical facilities therefore are something created by the school for a particular purpose. School physical facilities were moderately adequate as assessed by the respondents. Moderately adequate means that physical facilities were just enough to be used or utilized by the respondents. Respondents “agree” to the services rendered by the library. The respondents strongly agreed that “the library is accessible to the faculty and to the students.” This can be supported by the fact that the library was located near the High School Building.

IV. Teacher Factors

Teacher factors include teaching effectiveness as to commitment, knowledge of subject, teaching for independent learning, and management of learning. As to knowledge of the subject and teaching for independent learning, the respondents rated the teacher as “outstanding”. This means that the teacher was an exceptional model. As to commitment and management of learning, the respondents rated the teacher “very outstanding” which means that the teacher met and often exceeded the job requirements.

Level of Academic Performance in Physics of the Fourth Year Laboratory High School Students SY 2011-2012
No one among the fourth year students failed in Physics. Nine percent had exactly a passing mark, 33 percent had satisfactory level of performance, 36 percent had good level of performance, 21 percent had very good level of performance and none had excellent level of performance.

Relationship of Academic Performance in Physics to the Characteristics of Respondents

Gender showed significant low correlation. Coding for gender was that 1 for female and 2 for male. The lower the coding value for gender, the higher was the academic performance. Therefore, the lower number of male (greater number of female), the academic performance was higher. This was supported by the computation of the mean for the academic performance for female and academic performance for male. The mean for female (81.81) was higher than mean for male (78.59).

Both the GPA in Mathematics and GPA in English showed high positive correlation to academic performance. As academic performance in Physics increased, GPA in Math and in English increased. These high relationships were due to the fact that both Math and English were the languages of Physics. Physics uses English as a medium of instruction; it uses Mathematics because most topics entail calculation. The result conformed to the study of Yumul (2001) which revealed relationship of Achievement in Mathematics and Achievement in English among the other student factors to board examination performance in Engineering. The finding runs parallel to the finding in the study of Aspiras (2005) that the attitude towards Physics and study habits were significantly related to performance in Mathematics.

Only four factors showed significant relationship to academic performance in Physics at 0.05 level of significance. These were GPA in Math, GPA in English, attitude towards Physics and study habits. All belong to student-related factors. In the study of Nuesca (2001), among the factors which were significantly related to academic performance was attitude towards computer subjects.

Predictors of Academic Performance

Using Multiple Regression Analysis at 0.05 level of significance, the different factors affecting the academic performance of the fourth year high school for the SY 2011-2012 were the student factors specifically gender, GPA in Math, GPA in English, and study habits. Table 1 shows the predictors of academic performance of the fourth year high school for the SY 2011-2012.

Among the identified predictors of academic performance, the best predictor, significant at 0.05, was the GPA in Mathematics using Stepwise Regression Technique with coefficient of determination ($R^2$) equal to 0.753. This means that 75.3 percent is the variation contribution of GPA in Math together with all the different factors (student, family-related, school related and teacher) to academic performance in Physics. The coefficient of multiple correlation ($R$) equal to 0.868 means that there is a high positive relationship of the combination of all the factors and GPA in Math to academic performance in Physics.
Table 1. Predictors of Academic Performance

<table>
<thead>
<tr>
<th>Independent Variables</th>
<th>B</th>
<th>R</th>
<th>R²</th>
<th>F-value</th>
<th>P-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>GPA in Math</td>
<td>0.499</td>
<td>0.868</td>
<td>0.753</td>
<td>94.358</td>
<td>0.000*</td>
</tr>
<tr>
<td>GPA in Math, Study Habits</td>
<td>1.548</td>
<td>0.893</td>
<td>0.797</td>
<td>58.945</td>
<td>0.000*</td>
</tr>
<tr>
<td>GPA in Math, Study Habits, GPA in English</td>
<td>0.463</td>
<td>0.914</td>
<td>0.836</td>
<td>49.378</td>
<td>0.000*</td>
</tr>
<tr>
<td>GPA in Math, Study Habits, GPA in English, Gender</td>
<td>-2.117</td>
<td>0.933</td>
<td>0.871</td>
<td>47.393</td>
<td>0.000*</td>
</tr>
<tr>
<td>Constant</td>
<td>-2.314</td>
<td></td>
<td></td>
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</tbody>
</table>

* significant at 0.05

When combined with study habits, the GPA in Math together with the different factors (student, family-related, school related and teacher) showed contribution of 79.7% to variation in the academic performance in Physics. The coefficient of multiple correlation (R) equal to 0.893 means that there was a high positive relationship of the combination of all the other factors together with GPA in Math plus study habits to academic performance in Physics.

GPA in Math, study habits and GPA in English in combination to the different factors showed contribution of 83.6 percent to the variation in the academic performance in Physics. The coefficient of multiple correlation (R) equal to 0.914 means that there was a very high positive relationship of the combination of all the other factors together with GPA in Math, study habits and GPA in English to academic performance in Physics. The combination of all the predictors (GPA in Math, study habits, GPA in English, and gender) together with the different factors, had a contribution of 87.1 percent to the variation in academic performance in Physics. The coefficient of multiple correlation of 0.933 means that there was a very high relationship that exists between (GPA in Math, study habits, GPA in English, and gender) together with the other factors to the academic performance in Physics.

The regression equation then, based on Stepwise Regression Technique was,

\[ Y = -2.314 + 0.499X_1 + 1.548X_2 + 0.463X_3 - 2.117X_4 \]

where \( X_1 \) is GPA in Math, \( X_2 \) is study habits, \( X_3 \) is GPA in English and \( X_4 \) is Gender. The positive contribution of GPA in Math, study habits, and GPA in English in the regression equation means that as these factors increased then academic performance in Physics increased. Gender in contrast can contribute to the decrease in academic performance in Physics as signified by the negative sign. This can be attributed to the greater number of male students than female students. This regression equation is significant at 0.05 level.

It can be noted that only 12.9 percent cannot be accounted by the linear regression equation. Therefore with this high level of influence, the estimated regression equation was useful in estimating or predicting the values of the academic performance in Physics.
The result of this study was the same with the study of Yumul (2001). According to his study, the best predictor of board performance in Engineering is GPA in Mathematics. Inference can be made with the result of this study and with the study of Yumul. Both studies revealed the importance of Mathematics. Note that Mathematics is a means to calculate Physics problems and Mathematics also is the major tool in Engineering subjects.

Conclusions

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

1. Most of the parents of the respondents were educated, employed and had high income. Also, parents show support to the learning of their children. For the respondents, there are more males than females; they had satisfactory GPA in Mathematics and GPA in English; they had positive attitude towards Physics; they sometimes possess good study habits; and they are influenced at a certain degree by their peers. As to school physical resources, physical facilities are moderately adequate and library services are provided.
2. The teacher was effective in teaching Physics.
3. The students’ have gained knowledge and developed psychomotor skills, and human skills based on the concepts, principles, and theories in Physics.
4. Students performance in Physics will be higher if they perform better in English and Mathematics, if they show positive attitude towards Physics, and if they possess good study habits.
4.1 Among the factors, GPA in Math had the best influence to academic performance in Physics.

Recommendations

Based on the conclusions, the researcher recommends that:
1. Parents should continue to support their children in their education.
2. Internal motivation through positive attitude towards Physics should be possessed by students to perform better in Physics.
3. Students should enhance their study habits in order to cope with the different lessons not only in Physics but also to the other subjects.
4. Students should engage in peer teaching.
5. Physical resources should be increased in number.
6. Though teacher factors were not predictors of academic performance in Physics, the teacher in Physics should sustain the teaching performance to ensure learning of the students.
7. Since Math and English belong to the predictors of academic performance in Physics, there should be a strong foundation of students in these two subjects.
8. A similar study is to be conducted with inclusion of other factors not mentioned in the study to find for the missing 12.9 percent not accounted by the regression equation.

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