

MENTAL ABILITY, WORK BEHAVIOR AND TRAIT SURVEY OF HIGH AND LOW PERFORMING FIRST YEAR COMPUTER ENGINEERING STUDENTS

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ABSTRACT

Preparing the students to become valuable contributors and assets of their respective workplaces in the future is the general consideration of this study. Descriptive type of research was utilized in the study. Result showed that high performing students have significantly higher persistence in doing their work and they have significantly higher expectations of positive effect from achievement – oriented activity than those low performing students. Numerical computation, verbal ability, perseverance, affective and purposive traits are significantly related to the academic performance of the first year computer engineering students. Verbal ability, affective trait and numerical computation are the predictors of the academic performance with 49 percent likelihood.

Keywords: Academic Performance, Mental Ability, Work Behavior, Trait, Computer Engineering.

INTRODUCTION

Identifying the capabilities and characteristics of the first year students as new members of the university would provide initial data and information on how the student development programs would be suitable for them to enhance their acquired abilities and behavior and develop more their traits. Arguelles and Bay (2014) on their previous study noted that freshman students conveyed determination to finish their chosen program in this University however, expressed to be still of need for Career Guidance particularly in career planning to establish one's profession and get a high paying job as soon as they finish college are aspired. The role of the student services especially counseling is very integral in making a holistic individual who could contribute to the attainment of the mission and vision of the institution and who could also make a difference in building the nation.

Mental abilities of the students are being developed and enhanced through various classroom exercises with the use different teaching strategies and methodologies suitable to the level and nature of the learners. Therefore, it is imperative that their intellectual capabilities be determined before classroom instruction starts (Laguador, 2014). The abstract and numerical reasoning, numerical computation and verbal abilities are the basic foundations of knowledge that need reinforcement to establish confidence and intellectual prowess among the students. Students must not only be given enough knowledge and skills for them to become successful but also enhancing their character and values will make them more unbeatable (Laguador & Pureza, 2013).

College is a preparation for their professional career; therefore, work behavior is essential part of their development to secure a bright future ahead of them through having meaningful extra-curricular activities that would support the classroom instruction. School activities are facilitated to shape the character of future leaders and professionals of the country based on the University core values: God-centeredness, Leadership, Integrity and Nationalism (Laguador, Dotong & De Castro, 2014). Diverse work environment and complex situations in the organization are some of the challenges they would be facing after college. Improving their problem solving and management skills is also vital part of their growth. The energy they should be exerted in the assigned tasks, order/scheduling, working and communicating with the team, emotional stability and their perseverance are some of the important work behaviors that the university needs to address to ensure the quality of student outcomes.

From the previous study of Laguador and Ramos (2014), they emphasized that work attitude and behavior of the employees are also important aspects of employment skills that should always be integrated in all curricula such as valuing commitment, loyalty, high sense of professionalism with moral integrity as well as the significance of being result-oriented, trainable and proactive individuals. The valuable traits of affective, conceptual, purposive, instrumental and evaluative are considered essential part of this study to measure their positive attitude towards life, capability of attaining goals and assessing oneself for success. The outcomes of every responsibility assigned and destined for the students to achieve are results of how they see things in the future positively and how capable they are in setting and attaining the specific set of goals. Making them aware on how these traits affect their future would let them see that value of the efforts of the teachers and the academic community on giving them such services to improve their totality to become future leaders of their respective disciplines.

The initial measure of the achievement of the first year students after a year of stay in the university is their academic performance which serves as a basis of their intellectual ability based on the standards and practices of the institution. It quantifies the capability of the students in terms of the level of their achievement but it does not measure the overall capacity to excel in certain activity (Bulaklak & Pilobello, 2014). Considering this as part of the study would give a partial picture of how students respond to the needs of the degree program, of the institution and of their future career. Complexities and challenging demands of engineering sometimes affect the way students appreciate the value of education through maintaining their academic performance that measures their ability to demonstrate knowledge, values and skills (Laguador & Pesigan, 2013). The integration of values in all general and professional courses is necessary to provide not only the specific application of skills required but the students can also be equipped with appropriate attitude and behaviour towards work (Dotong, 2014). Preparing the students to become valuable contributors and assets of their respective workplaces in the future is the general consideration of this study. Seeing and knowing them in the perspective of teachers and counselors as agents and instruments of their success. The university who lives with the students in full brightness is a kind of environment where learning takes place with competence, credibility, commitment and care for the success of every learner.

OBJECTIVES OF THE STUDY

This study aimed to determine the level of academic performance of the First Year Computer Engineering Students during the SY 2014-2015; to determine the result of standard battery assessment of the high and low performing students in terms of Mental Ability, Work

Behavior and Trait Survey; test the significant difference in the result of standard battery assessment between the two groups; test the relationship between academic performance and the result of standard battery assessment; and determine which variable/s best predict/s the academic performance of the students.

Ho₁: There is no difference in the result of standard battery assessment between high and low performing students.

Ho₂: There is no relationship between academic performance and the result of standard battery assessment

METHODS

Descriptive type of research was utilized in the study. The Standard Battery Assessment was administered to first year Computer Engineering students last January 18 and 25 and February 28, 2015. With the support of the College of Engineering, 31 out of 31 or 100% of the Computer Engineering students took the assessment. Mental Ability, Work Behavior Profile and Trait survey are the three major components of the assessment to be measured. The instrument is a standard test from the Asian Psychological Services and Assessment, Inc (APSA).

Documentary analysis was utilized in gathering the general weighted average of the students from the College of Engineering. The students were grouped according to the result of their computed general weighted average for 1st and 2nd semester during School Year 2014-2015 taken as one score. The grading system of the university used grade equivalent of 1.00 as 98 – 100 percent (highest rate); 3 as 75 percent (passing rate) and 5 as below 75 percent (failing rate).

The given scale was used to interpret the result of the standard battery assessment: 50- 59: Poor (P); 60- 69: Low Average (LA); 70-74: Below Average (BA); 75-85: Average (A); 86 – 90: Above Average (AA); 91 – 100: High Average (HA); 101-110: Superior (S).

Weighted average was utilized to generate the result of the academic performance of the students for two semesters. Frequency count and percentage was employed to identify the number of students per group. Independent sample t-test was used to determine the difference between the High and Low Performing Freshman Computer Engineering Students in terms of Mental Ability, Work Behavior and Trait Survey. Linear Regression Analysis was utilized to determine the relationship between academic performance and the result of Standard Battery Assessment as well as to identify the best predictor of academic performance among the constructs from the three major variables.

RESULTS AND DISCUSSION

Table 1: Academic Performance of the First Year Computer Engineering Students SY 2014-2015

| General Weighted Average | Interpretation | F | % |
|--------------------------|-----------------|----|-------|
| 2.26 – 5.00 | Low Performing | 20 | 64.52 |
| 1.00 - 2.25 | High Performing | 11 | 35.48 |

Grading: 1.00: 98 – 100%; 3.00: 75%; 5: Failed

Table 1 presents the academic performance of the First Year Computer Engineering Students SY 2014-2015. There are only 11 or 35.48 percent of the computer engineering students considered as high performing with general weighted average from 1.00 – 2.25 against the 20 or 64.52 percent of low performing with general weighted average from 2.26 to 5.00. Many aspects of college education are included in the totality of this performance whether sports and cultural exercises of the university were also part of academic growth of all students (Laguador, 2013). Since engineering is considered one of the hardest degree programs in college, with introductory courses in higher mathematics and applied sciences, students tend to obtain low or very low performance ratings if they would not exert too much effort on their studies and if they would not take this program seriously by heart, by soul and by deeds.

Table 2 presents the difference between the High and Low Performing Freshman Computer Engineering Students in terms of Mental Ability, Work Behavior and Trait Survey. The results of Mental Ability test of high and low performing students have no significant difference. This signifies that the computed variance between the two groups is very small or not adequate to consider the differences as significant. Therefore, their mental ability scores are almost comparable in terms of abstract reasoning, numerical reasoning, numerical computation and verbal ability.

Table 2: Difference between the High and Low Performing Freshman Computer Engineering Students in terms of Mental Ability, Work Behavior and Trait Survey

| | Low | VI | High | VI | p-value | Decision |
|-------------------------|--------------|-----------|--------------|-----------|--------------|---------------|
| Abstract | 84.00 | A | 81.55 | A | .526 | Accept |
| Numerical Reasoning | 84.64 | A | 90.91 | AA | .170 | Accept |
| Numerical Computation | 74.07 | BA | 80.91 | A | .069 | Accept |
| Verbal | 76.93 | A | 79.82 | A | .306 | Accept |
| Mental Ability Average | 80.00 | A | 83.55 | A | .170 | Accept |
| Energy | 78.86 | A | 84.36 | A | .060 | Accept |
| Order/Scheduling | 85.21 | AA | 87.73 | AA | .266 | Accept |
| Deference | 85.21 | AA | 82.00 | A | .251 | Accept |
| Interpersonal Relations | 83.57 | A | 87.91 | AA | .118 | Accept |
| Emotional Stability | 83.21 | A | 84.91 | A | .534 | Accept |
| Perseverance | 82.86 | A | 89.45 | AA | .003* | Reject |
| Work Behavior Average | 83.21 | A | 86.00 | AA | .058 | Accept |
| Affective | 63.00 | LA | 80.91 | A | .006* | Reject |
| Conceptual | 68.00 | LA | 72.09 | BA | .452 | Accept |
| Purposive | 78.86 | A | 84.27 | A | .378 | Accept |
| Instrumental | 68.43 | LA | 71.27 | BA | .563 | Accept |
| Evaluative | 73.43 | BA | 75.27 | A | .697 | Accept |
| Trait Survey Average | 70.36 | BA | 76.82 | A | .075 | Accept |

*Significant at 0.05

Both groups have also comparable work behaviour in terms of energy, order/scheduling, deference, interpersonal relations and emotional stability as denoted by the p-values which are all greater than the 0.05 level of significance. The computed variance is also not adequate to consider the differences in terms of work behaviour except for perseverance.

The two groups can also be described with similarities in terms of their conceptual, purposive, instrumental and evaluative traits except for affective trait. Although high

performing students obtained higher values on trait survey but the computed variance is not adequate to consider the differences.

High and low performing students obtained the highest score in numerical reasoning above average and average rating respectively. High performing students obtained the lowest score in verbal ability (79.82) while low performing group obtained the least score in numerical computation (74.07). Mathematics requires the students to use analytical reasoning skills, problem solving skills and critical thinking skills (Reyes & Castillo, 2015). Comprehension is one of the keys for understanding worded problems in Mathematics with an aid of verbal aptitude. Logical and analytical thinking are necessary skills needed by the students as well as the prior and stock knowledge on how to analyze and calculate certain problems.

High performing students have the highest rating on perseverance (89.45) and lowest on deference (82) while low performing obtained highest rating on order/scheduling and deference (85.21) and the least rating on energy (78.86). High performing students have the highest rating on purposive trait (84.27) and the least rating on instrumental trait (71.27) while low performing students have the highest rating also on purposive trait (78.86) and the least rating on affective trait (63.00). Low performing students are good in setting up goals for the self-direction of behaviour but they are somewhat lacking on placing positive views and perspective on the outcomes of certain achievement – oriented activity for them procrastinate during the process and end up with unsatisfactory performance.

There is a significant difference in work behaviour of the students in terms of perseverance and trait survey in terms of affective. High performing students have significantly higher persistence in doing work, keeping on a task until its completion, maintain quality of performance in routinary work, surmounting obstacles to finish one's work compared to low performing students. High performing students have also significantly higher expectations of positive effect from achievement – oriented activity than those low performing students. They also have reflected higher positive attitude towards life enabling one to see task as a means to attain pleasant outcomes.

Keeping the students aware of the work values they should possess during the training served as their guide towards exhibiting good attitude towards people which also promotes positive results at work (Martinez, Lontoc, Villena & Laguador, 2014). Laguador and Dotong (2013) found out the work related values such as perseverance and hard work have greatly contributed to the job placement of computer engineering graduates. Therefore, making the students realize the value of perseverance which can be seen through determination and commitment towards work would prepare them to their future employment.

Table 3: Relationship of Academic Performance with Mental Ability, Work Behavior Profile and Trait Survey

| Assessment | r-value | p-value | Interpretation | Decision |
|------------------------|---------|---------|-----------------|----------|
| Abstract | .028 | .895 | Not Significant | Accept |
| Numerical Reasoning | .210 | .313 | Not Significant | Accept |
| Numerical Computation | .423(*) | .035 | Significant | Reject |
| Verbal | .484(*) | .014 | Significant | Reject |
| Mental Ability Average | .405(*) | .045 | Significant | Reject |
| Energy | .275 | .183 | Not Significant | Accept |
| Order/Scheduling | .182 | .385 | Not Significant | Accept |
| Deference | -.266 | .200 | Not Significant | Accept |

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|-------------------------|----------|------|-----------------|--------|
| Interpersonal Relations | .161 | .441 | Not Significant | Accept |
| Emotional Stability | .046 | .826 | Not Significant | Accept |
| Perseverance | .399(*) | .048 | Significant | Reject |
| Work Behavior Average | .206 | .323 | Not Significant | Accept |
| Affective | .473(*) | .017 | Significant | Reject |
| Conceptual | .211 | .311 | Not Significant | Accept |
| Purposive | .446(*) | .025 | Significant | Reject |
| Instrumental | .244 | .241 | Not Significant | Accept |
| Evaluative | .132 | .530 | Not Significant | Accept |
| Trait Survey Average | .514(**) | .009 | Significant | Reject |

* Correlation is significant at the 0.05 level (2-tailed).

** Correlation is significant at the 0.01 level (2-tailed).

Table 3 reveals the relationship of academic performance with Mental Ability, Work Behavior and Trait Survey. Results showed that there is a significant positive relationship between the academic performance of the first year computer engineering students and the following variables: numerical computation, verbal ability, perseverance, affective and purposive traits as denoted by the computed p-values which are less than the 0.05 level of significance. Therefore, the null hypothesis is rejected on these variables. This signifies that those students with high academic performance also obtained high ratings on the mentioned characteristics while those students with low academic performance obtained the least.

Credé and Kuncel (2008) mentioned an important distinction between two stages of academic performance where the first stage includes the behind the-scenes behaviors involving studying, time management, and avoidance of behaviors that are counterproductive for classroom success. This stage of performance determines the amount of knowledge and skill acquired.

Table 4. Predictor of Academic Performance of First Year Computer Engineering Students (Model Summary)

| Model | R | R Square | Adjusted R Square | Std. Error of the Estimate |
|-------|---------|----------|-------------------|----------------------------|
| 1 | .484(a) | .235 | .201 | .37359 |
| 2 | .619(b) | .383 | .327 | .34290 |
| 3 | .700(c) | .490 | .417 | .31921 |

a Predictors: (Constant), Verbal

b Predictors: (Constant), Verbal, Affective

c Predictors: (Constant), Verbal, Affective, Numerical Computation

The combination of verbal ability, affective trait and numerical computation has a 49 percent of probability to predict the academic performance of the engineering students based on the given General Weighted Average and the result of their Standard Battery Assessment. Verbal aptitude is an important aspect of communication either written or oral. The students' comprehension on how they understand the mathematical worded problems is based on how rich their vocabularies and how accurate they can interpret the relationship of words and values in a certain problem. This is coupled with affective trait that enables them to see positive outcomes out of the academic activities or undertakings.

CONCLUSION AND RECOMMENDATION

There are more low performing students in First Year Computer Engineering than high performing students with 29 percent difference between the two groups. High and Low performing students have almost similar level of average result on their mental ability test while high performing students have one level ahead compared to low performing students in terms of work behavior and trait survey. High performing students have significantly higher persistence in doing their work and they have significantly higher expectations of positive effect from achievement – oriented activity than those low performing students. There is a significant positive relationship between the academic performance of the first year computer engineering students and the following variables: numerical computation, verbal ability, perseverance, affective and purposive traits. Verbal ability, affective trait and numerical computation are the predictors of the academic performance of First Year Computer Engineering Students with 49 percent likelihood.

It is recommended that the Guidance Counselors may constantly provide assistance to students with behavioural problems especially those who are referred to them for counselling. Counselling and Testing Center may invite low performing students for mini seminars or talks especially designed for their specific needs. Mañibo & Lopez (2014) noted that the students should reinforce outcomes through their own abilities, efforts, skills and characteristics for related career success. The College of Engineering must strengthen the verbal aptitude, numerical computation and affective trait of the First Year Computer Engineering students as these are considered predictors of the academic performance.

The students' performance in the classroom is largely affected by the quality of teachers assigned to teach the course (Red, 2011). Teachers may consistently advise those students with academic related problems to get them through all the challenges of engineering program. Teachers may provide classroom instructions and activities that would highlight the value of perseverance in the learning process to let the low performing students accomplish their tasks successfully like how the high performing students do it. Learners are encouraged and challenged when teaching strategies or instructional methodologies cater within their sphere of interests and values (Alcantara, Deligero & Laguador, 2015). Learning could be best acquired in a situation where students can easily adapt to the atmosphere that encourages active participation and cooperation among members of the class (Bacay, Dotong & Laguador, 2015).

The Office of Student Affairs may continuously provide extra-curricular activities like leadership camps not only for students with inherent leadership abilities but also for those students who need to develop their leadership qualities. Guiding them well and lot of patience and understanding must be given to the students who need to be nourished their management ability to survive in more complex challenges of engineering (Laguador, Velasquez & Forendo, 2013). Future researchers may deal on studying the mental ability, work behaviour and traits of those students who stayed after a year in the engineering program.

REFERENCES

- Alcantara, F., Deligero, J. C. L., & Laguador, J. M. (2015). Profile Aspirations of Maritime Students in one Higher Education in the Philippines, *Asian Journal of Basic and Applied Sciences*, 2(2),24 – 31

- Arguelles, S. W. G. and Bay, A. B. (2014). Career Related Profile of Freshman Students for Academic Year 2013 – 2014: Basis for a Career Development Plan, *International Journal of Academic Research in Psychology*, 1(2), 136-146.
- Bacay, T. E., Dotong, C. I., Laguador, J. M. (2015). Attitude of Marine Engineering Students on Some School-Related Factors and their Academic Performance in Electro Technology 1 and 2, *Studies in Social Sciences and Humanities*, 2(4), 239-249.
- Bulaklak, E. M. & Pilobello, B. I. (2014). Observed Classroom Practices and Academic Behavior in Physical Education 1 of Freshman Psychology and Education Students, *Asia Pacific Journal of Education, Arts and Sciences*, 1(5), 144-148.
- Credé, M., & Kuncel, N. R. (2008). Study habits, skills, and attitudes: The third pillar supporting collegiate academic performance. *Perspectives on Psychological Science*, 3(6), 425-453.
- Dotong, C. I. (2014). School – Related Factors in the Development of Graduates' Competencies towards Employability, *Journal of Education and Literature*, 1(1), 28-36.
- Laguador, J.M. (2013). Academic Performance of Freshman Engineering Students Based on their Perception and Actual Final Grades, *Journal of International Academic Research for Multidisciplinary*, 1(7): 1-8.
- Laguador, J. M. (2014). Examination of Influence and Intention towards Lyceum of the Philippines University and Career Choice of General Engineering Students, *International Journal of Management Sciences*, 3(11), 847-855.
- Laguador, J. M. & Dotong, C. I., De Castro, E. A. (2014). The Experience of Lyceum of the Philippines University-Batangas in Getting Ahead of Accreditation and Certification, *International Journal of Social Sciences, Arts and Humanities*, 2(2), 56-61.
- Laguador, J. M. & Ramos, L. R. (2014). Industry-Partners' Preferences for Graduates: Input on Curriculum Development, *Journal of Education and Literature*, 1(1), 1-8.
- Laguador, J.M. & Pureza, R.J. (2013). Relationship between Attitude and Performance in “Introduction to Information Technology” Course of Engineering Students, *International Journal of Social Science & Interdisciplinary Research*, 2(6): 1-9.
- Laguador, J.M., Pesigan, M. (2013). Academic Performance and Measure of Character and Personality of Engineering Students With and Without Referral from Counselling Center, *Asian Academic Research Journal of Social Science & Humanities*, 1(16): 281-293.
- Laguador, J.M., Dotong, C.I., (2013). Tracer Study of BS Computer Engineering Graduates of Lyceum of the Philippines University, *International Journal of Management, IT and Engineering*, 3(8): 387-401.
- Laguador, J.M., Velasquez, M.E., Forendo, K.C. (2013). Leadership Capability Assessment of Senior Industrial Engineering Students, *International Journal of Basic Applied & Social Sciences*, 1(3): 7-12.
- Mañibo, J., & Lopez, E. R. (2014). Locus of Control and Career Interest of Sophomore Accountancy Students: Basis for Employment Path, *Asia Pacific Journal of Multidisciplinary Research*, 2(1), 14-19.
- Martinez, C., Lontoc, J., Villena, A. C. Laguador, J. M. (2014). Correlation of On-The-Job Training Performance on Print Media of AB Mass Communication Students and Academic Performance in Selected Professional Courses for School Year 2012-2013, *Journal of Education and Literature*, 2(3), 80-88.
- Red, E.Z. (2011). Students' Performance and Satisfaction with the Cisco Academy Networking Program for Pedagogical Action in Blended Learning, *International Journal of Multidisciplinary Research*, 2(1): 183-198.

Reyes, M. D., & Castillo, A. C. Test Anxiety and College Students' Performance on Mathematics Departmental Examination: Basis for Mathematics Achievement Enhancement, *Asia Pacific Journal of Education, Arts and Sciences*, 2(1), 62-69.