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CORRELATION OF STEM STUDENTS' PERFORMANCE IN THE NATIONAL CAREER ASSESSMENT EXAMINATION AND ACADEMIC SUBJECTS

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Abstract

The study aims to determine if the students' performance in the National Career Assessment Examination (NCAE) is significantly correlated to their academic performance in the succeeding grade levels. NCAE isa career direction program through an aptitude test administered to students. The academic subjects considered in the study include Science, Mathematics and English; while the grade levels take account of Grade 9 (through NCAE results), and Grades 10 and 11. The researchers employed the purposive sampling, taking into consideration the selection of students who qualified in the required cut-off score/grade for admission in the academic track of Science, Technology, Engineering and Mathematics (STEM). The statistical findings revealed that the learners got the highest grade in Science both in NCAE and Grade 10, while English in Grade 11. Significant positive correlations of the students' performance were consistently observed in the three academic areas and in the three grade levels. This pattern is

indicative of: (1) a proper career assessment conducted that guide the learners in choosing the academic track where they have better aptitude or potential; (2) a sensible screening criteria set in selecting students to be admitted in the STEM track; and (3) an evidence of quantified judgments on the learners' academic achievements per grade level as a product of the design of the spiral curriculum.

Keywords

Career Assessment, K to 12 Program, Senior High School, STEM Track, Students' Performance

1. Introduction

In the Philippine education, the last mile of the K to 12 Program is the Senior High School (SHS). This covers the last two years of the program, namely, the Grades 11 and 12. Prior to admission to SHS, a career direction program to Grade 9 students is to be administered through the National Career Admission Examination (NCAE).It aims to maintain the highest quality of education by regulating and monitoring the flow of high school graduates to courses where they have better aptitude or potential (Escudero, 2016). The results of the test serve as recommendatory and to be used for career guidance purposes.

The first batch of students entered SHS on June 2016and each of them chose one to master among the following academic tracks: Accountancy, Business and Management (ABM); Humanities and Social Sciences (HUMSS); and Science, Technology, Engineering and Mathematics (STEM).

In this context, being the first batch of students in the country who enrolled in the last mile of the K to 12 program, the researchers opted to conduct a scientific investigation to determine if significant correlations exist in the students' performance in the career assessment examination and their academic performance in the succeeding grade levels.

2. Methodology

The study employed the descriptive method of research. It deals with the gathering of facts or information pertaining to the given conditions or situations for the purpose of description and inclusion of proper analysis and interpretation.

The following instruments were utilized to gather data from the samples: (1) National Career Assessment Examination (NCAE), an aptitude test administered to Grade 9 which provides relevant information on the learners' skills, abilities and readiness for academic and non-academic courses and other information that help high school students make wise career decision; (2) Form 138, a report card which shows the learners' progress and learning achievements from First to Fourth Quarter period of Grade 10; and (3) Report of Grades, which presents the Grade 11 student's average grade in the First and Second Quarter period of the First Semester of the Academic Year 2016-2017.

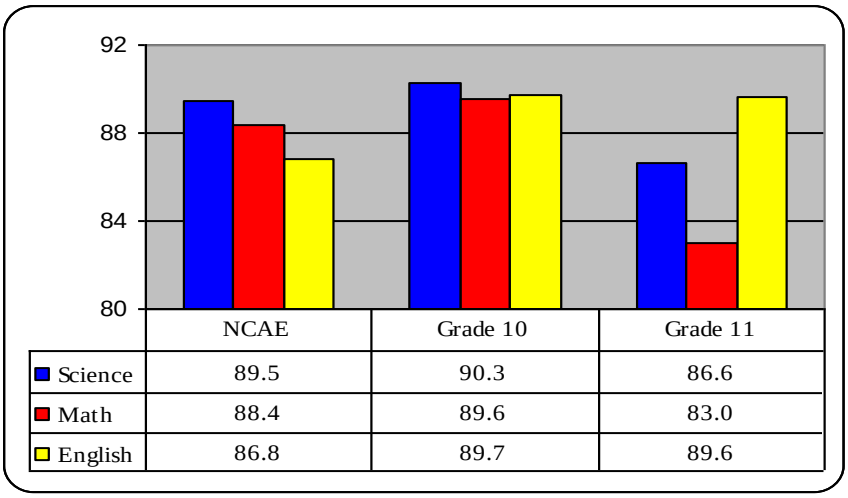
To investigate scientifically, the researchers utilized the purposive sampling, taking into consideration the selection of samples who qualified in the required cut-off score/grade for students in the STEM track as per screening criteria set by Department of Education through DepEd Order No. 55, series of 2016. With the cut-off percentile rank of at least 86 in the STEM subtest in NCAE and the cut-off academic grades of at least 85 both in Science and Mathematics in Grade 10, there were 206 out of 547 Grade 11 students (38%) selected as samples. Note that the 547students were admitted already prior to the issuance of this order.

The researchers employed the following statistical tools: (1) the simple mean, to describe the average performance of the learners; (2) the Pearson r product moment of correlation, to determine the relationships of the students' performance in the academic areas and grade levels; and (3) the t-test, to determine whether the computed correlations are significant or not considering the 95% confidence level.

3. Results and Discussion

3.1 Students' Performance in the Subject Areas by Grade Level

In the National Career Assessment Examination, the learners' scholastic aptitudes were measured based on the following: scientific ability (Science); mathematical and logical reasoning abilities (Mathematics); and reading comprehension and verbal abilities (English).



	NCAE	Grade 10	Grade 11
Science	89.5	90.3	86.6
Math	88.4	89.6	83.0
English	86.8	89.7	89.6

Figure1: *Performance in the Subject Area by Grade Level*

The NCAE results (Figure 1) revealed that the learners got the highest average percentile rank in Science (89.5), where their scientific abilities were assessed together with their skills to adopt scientific methods, procedures and processes in constructing knowledge and solving experimental or real-life problems (NETRC, 2014).Second to the highest percentile rank was posted in Mathematics (88.4), where the students' quantitative abilities and computational skills were assessed, particularly on working with numbers, perceiving relationship between two quantities and solving arithmetic problems (NETRC, 2014).Third, is in English (86.8), where assessment was made to measure the individual's ability to understand what has been stated directly; to analyze, interpret, and criticize what has been read; to recognize reasonable application of principles or opinions expressed by the author; and to measure the assertive ability of a person in view of grammatical rules and logical arrangement of ideas (NETRC, 2014).

Similar to the performance in NCAE, the learners got the highest average grade in Science (90.3) in Grade 10. In this subject, they learned about the topics on volcanoes and earthquakes and that these occur in the same places in the world and are related to plate boundaries (K to 12 Science Curriculum Guide, 2016). They placed second to the highest in English (89.7), where demonstration of communicative competence was discussed through individual's understanding of literature and other text types for a deeper appreciation of World Literature, including Philippine Literature (K to 12 English Curriculum Guide, 2016).Third to the highest performance was recorded in Mathematics (89.6).In this subject, they learned about the key concepts and principles of patterns and algebra; geometry; and statistics and probability

as applied - using appropriate technology - in critical thinking, problem solving, reasoning, communicating, making connections, representations, and decisions in real life (K to 12 Mathematics Curriculum Guide, 2016).

Unlike in NCAE and Grade 10, the Grade 11 students placed the highest average grade in English (89.60). In this subject, specifically in Oral Communication, they learned about listening and speaking skills and strategies for effective communication in various situations (K to 12 English Curriculum Guide, 2016). In Earth Science, which they got second to the highest (86.6), learning about Earth on a planetary scale took place which includes the history, structure and composition, processes, issues, concerns, and problems pertaining to Earth's resources (K to 12 Science Curriculum Guide, 2016). The learners positioned third to the highest in Mathematics (83.0). Specifically in General Mathematics, they learned how to solve problems involving rational, exponential and logarithmic functions; to solve business-related problems; and to apply logic to real-life situations; while in Pre-Calculus, they learned how to apply concepts and solve problems involving conic sections, systems of nonlinear equations, series and mathematical induction, circular and trigonometric functions, trigonometric identities, and polar coordinate system (K to 12 Mathematics Curriculum Guide, 2016).

3.2 Correlation of Performance in the Subject Area by Grade Level

A number of researches were conducted focusing the investigations on the relationships of the learners' performance in various academic subjects. Basista and Mathews (2002) found out that Science provides rich contexts and concrete phenomena demonstrating mathematical patterns and relationships; while Mathematics, according to them, provides the language and tools necessary for deeper analysis of science concepts and applications. Saquing-Guingab (2015) exposed from the correlation analysis that the language usage score of the sample learners and their academic achievement in Science and Mathematics indicated a highly significant correlation. This was found consistent with the findings of Henry, Nistor and Baltes (2014) where they concluded that English proficiency precedes mathematics proficiency, especially when the language of instruction is English. Accordingly, good mastering of English is needed to nurture and understand mathematics subject to achieve excellent results (Rambely, Ahmad, Majid & Jaaman, 2013).

Table 1: *Correlation of Performance in the Subject Area by Grade Level*

Grade Level	Subject Area	Correlation Coefficient	Computed t-value	Interpretation
NCAE	Science & Math	0.405	6.319	significant
	Math & English	0.433	6.865	significant
	English & Science	0.433	6.855	significant
Grade 10	Science & Math	0.454	7.274	significant
	Math & English	0.295	4.406	significant
	English & Science	0.446	7.111	significant
Grade 11	Science & Math	0.366	5.610	significant
	Math & English	0.236	3.469	significant
	English & Science	0.553	9.487	significant

Critical t-value = 1.960 at 95% confidence interval

Those findings were found consistent with the results of this study which was supported by the correlations of the performance in the subject areas by grade level ranging from 0.236 to 0.553 (Table 1). The computed t-values which were all greater than the critical t-value of 1.960 at 95% confidence interval further revealed that there were significant relationships in the learners' performance in the three academic subjects - Science, Mathematics and English in NCAE and Grades 10 and 11.

3.3 Correlation of Performance in the Grade Level by Subject Area

Significant correlations were observed in Science from NCAE to Grades 10 and 11. This is evident in the coefficient of correlations ranging from 0.289 to 0.395 with corresponding computed t-values larger than the critical value of 1.960 at 95% confidence interval (Table2).It may be noted that in the K to 12 Science Curriculum, the concepts and skills in Sciences are

presented with increasing levels of complexity from one grade level to another in spiral progression, paving the way to a deeper understanding of core concepts. The integration across science topics and other disciplines lead to a meaningful understanding of concepts and its application to real-life situations (K to 12 Science Curriculum Guide, 2016).

Table 2: *Correlation of Performance in the Grade Level by Subject Area*

Subject Area	Subject Area	Correlation Coefficient	Computed t-value	Interpretation
Science	NCAE & Grade 10	0.289	4.308	significant
	NCAE & Grade 11	0.292	4.369	significant
	Grades 10 & 11	0.395	6.148	significant
Math	NCAE & Grade 10	0.276	4.101	significant
	NCAE & Grade 11	0.349	5.321	significant
	Grades 10 & 11	0.555	9.527	significant
English	NCAE & Grade 10	0.307	4.607	significant
	NCAE & Grade 11	0.309	4.640	significant
	Grades 10 & 11	0.302	4.521	significant

Critical t-value = 1.960 at 95% confidence interval

The coefficient of correlations varying from 0.276 to 0.555 posted for Mathematics also resulted to the computed t-values higher than its critical value (Table 2). To note, the K to 10 Mathematics Curriculum provides necessary concepts and life skills needed by Filipino learners as they proceed to the next stage in their life as learners and as citizens of the Philippines. This curriculum is designed to provide a solid foundation for Mathematics at Grades 11 to 12 (K to 12 Mathematics Curriculum Guide, 2016).

Consistent with findings for Science and Mathematics, the coefficient of correlations in English, ranging from 0.302 to 0.309, also produced significant correlations(Table 2). It is worth

to note that skills, grammatical items, structures and various types of texts were taught, revised and revisited at increasing levels of difficulty and sophistication in the K to 12 English Curriculum. This allowed the learners to progress from the foundational level to higher levels of language use (K to 12 English Curriculum Guide, 2016).

Curriculum is a critical variable responsible for higher student achievement (Crawford & Snider, 2000). The spiral approach has long been used by curriculum designers to deepen learners' knowledge of scientific and mathematical concepts and to bring learners to higher levels of abstraction (Fried& Amit, 2005). In the spiral curriculum, the interactive, concrete, manipulative instructional approaches can be used in the early grades to introduce very sophisticated topics in almost any subject, although mathematics and science provide the greatest amount of evidence of this approach (Johnston, 2012).

4. Conclusions

The significant correlations of the students' performance in Science, Mathematics and English which were found consistent from NCAE to Grades 10 and 11 is indicative of: (1) a proper career assessment conducted that guide the learners in choosing the academic track where they have better aptitude or potential; (2) a sensible screening criteria set in selecting students to be admitted in the STEM track; and (3) an evidence of quantified judgments on the learners' academic achievements per grade level as a product of the design of the spiral curriculum.

5. Recommendations

Based on the foregoing conclusion, the following are hereby recommended: (1) make use of the results of the aptitude test to properly assess the learners' skills, abilities and readiness for academic courses to guide high school students make wise career decision; (2) set the criteria in screening students who will be admitted in SHS, not only in STEM, but also in other academic tracks; and (3) consider for future research the correlation of the students' performance in other academic tracks and also extend the selection of samples to students with performance below the cut-off score/grade set in the screening criteria.

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