Correlational Analysis on Stem Students' Ncae Scholastic Aptitude, Track Preference, and Occupational Interest, with SHS Academic Performance

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ABSTRACT

In the "new normal," a non-paper-and-pencil admission process becomes a challenge. This correlational analysis aims to choose possible admission candidates for SHS STEM strand by determining possible connections between the NCAE General Scholastic Aptitude (GSA), STEM Strand Preference (SSP), and Area of Occupational Interest (AOI), with the academic performance (AP) of STEM students of Ateneo de Iloilo (ADI) Senior High School (SHS). The study covered 124 STEM students data protection protocols. It showed that Ateneans have Proficient (85.6%; SD=3.13) AP and Above Average NCAE GSA (school: 93.95%; national: 37.87%) and SSP rating (90.92%). There is also a significant difference in the GWA if classified according to GSA (p=0.00), SSP (p=0.00), and AOI (p=0.031). There is a strong positive correlation (r=0.646, p=0.00) in the students' GWA and GSA. The same was likewise observed in students' Grade 11 performance (except PE) and their corresponding GSA areas: scientific ability, reading comprehension, verbal ability, mathematical ability, and logical reasoning ability. The study suggested that the direct relationship between NCAE and Grade 11 AP validates the efficacy of the NCAE instrument as guide in career/strand advising and in approximating students' potential AP in Grade 11.

INTRODUCTION

In this age and time, every decision counts, especially on matters pertaining to one's career choice. Although career development is a lifelong process, there are phases in our lives that we really have to make the most calculated decision to ensure that we are putting ourselves in a better position for long-term career growth (Clark, 2016).

One of the most crucial career phases is high school (Germeijs and Verschueren, 2006). It is where the "growth trajectories are in line with theoretical models in which orientation and broad exploration are necessary and important at the beginning of the career-decision process." To some, this is the make-or-break part where wrong decision may mean academic misalignment, vocational confusion, or total disillusionment that may end in a personal down-spiraling career path.

The yearly conduct of the National Career Assessment Examination (NCAE) and addition of two more years in the K-to-12 Department of Education (DepEd) framework are apparently responses to this this clear and present need. Millions of Filipino students, 14-16 years of age, are bound to choose the track and strand they wish to enroll in the two-year-old Senior High School (SHS). They are encouraged to use their NCAE-measured aptitude, preference, and interest as decision reference. They must choose and perform well for there is a caveat. As per DepEd Order 55 Series of 2016, students are strongly advised to pursue a specific college or technical-vocational education that is aligned with their course of choice.

NCAE somehow aims to match one's personality type and future compatible work (or even SHS) environment. This study is anchored on both Frank Parson Trait-Factor Theory and John Holland's Career Typology Theory who both strongly advocate that the closer the match between personal traits and job factors the greater the likelihood for successful job performance and satisfaction.

Parsons believe that "studying the interest, aptitude, and skills of the individuals (students)" is a good start in guiding them in their vocational path. It comes before "surveying the 'occupations' (strand and course)" and "matching the individual with the occupation." In the case of SHS students, Holland suggests that "assessment information (NCAE results included) can provide the basis for developing career possibilities into realities." Putting it in context, Holland says that if the students' scholastic aptitude strand preference and occupational interest are in sync with their strand of choice, then they are expected to perform better in SHS (even in college and beyond) than those with conflicting skills set.

But is it really the case? Is NCAE really a good reference of students in choosing a track, a strand, or a degree in college, or a career in life? Is there at least a degree of connection in the academic performance of students in SHS and their NCAE results? Did students really use and/ or benefit from an NCAE-based decision-making process? This study was predicated on the abovementioned theories and issues following framework shown in Figure 1. Ultimately, the research's particular intent was to determine possible connections between the NCAE General Scholastic Aptitude (GSA), STEM Strand Preference (SSP), and Area of Occupational Interest (AOI), with the academic performance (AP) of the Science, Technology, Engineering, and Mathematics (STEM) students of Ateneo de Iloilo-Santa Maria

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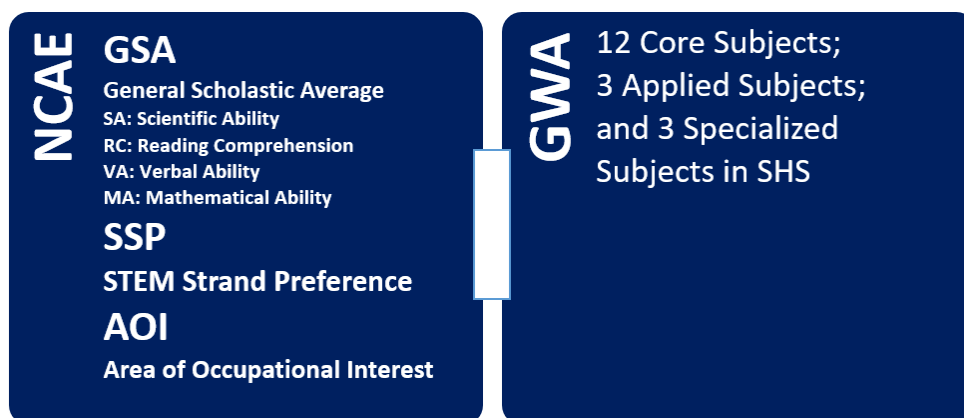
Figure 1: Schematic representation of the relationship between students' NCAE and GWA in SHS.

Catholic School (ADI-SMCS) SHS. Finally, it also hoped that the study will eventually gather practical information that would enhance the career development services of the school in terms of career advising, academic guidance, and goal-setting among high school students.

MATERIALS AND METHODS
This correlational analysis is focused on the measurement of the strength of the relationship between and among the following variables: NCAE GSA, SSP, AOI, and the AP of the Grade 12 STEM students of ADI-SMCS SHS and its practical use in career counseling thereof. Although ADI-SMCS SHS offers two strands, namely STEM and ABM (Accountancy, Business and Management), the study focused only on the 124 STEM strand students who comprised 67% of the total batch population.

NCAE in the study refers to the test conducted in November 19, 2014 which comprised, but not limited to, the following areas: GSA (Scientific ability, Reading Comprehension, Verbal Ability, Mathematical Ability, Logical-Reasoning Ability), STEM standard preference, occupational interest preference level, and overall rank. The students took the test in their school with DepEd-assigned proctors. It lasted for 7 hours and 30 minutes with 590 items. The scores of which show the Percentile Rank which is the examinees' position among all the examinees who took the test. The rating is classified as Excellent (99++%), Very High (98%-99%), Above Average (86%-97%), Average (51%-85%), Low Average (15%-50%), Below Average (3%-14%), Poor (1%-2%), and Very Poor (0%-0.99%).

The corresponding preferred course to take and field to pursue in college were also gathered from students. This was used to identify the students' percentage score in the AOI based on the 15-field Inventory of Occupational Interest of the NCAE. It is worthy to stress that instead of using the Rank 1 AOI percentage score of students, the researcher preferred to use the corresponding score of students' preferred field as this is the more appropriate gauge considering the context of study. The Level of Proficiency is classified as High preference (76%-100%), Moderate preference (51%-75%), Low Preference (26%-50%), and Very Low preference (0%-25%).

On the other hand, the subject and general average grades of the Grade 12 STEM students were the ones given by teachers and earned by students in the first and second semester of the previous school year (2016-2017) based on the courses, time duration, coverage, and competencies required by DepEd. Students' performances were evaluated following the Ateneo Grading System that adopts the KPUP scheme (Knowledge, 15%, Process and Skills, 25%, Understanding, 30%, and Performance Task, 30%). 18 subjects are included in the study. The grades are retrievable only in the Ateneo Integrated Student Information System (AISIS).

The NCAE and the corresponding Grade 11 academic records herewith were purposively gathered, collated, and analyzed following the confidentiality protocol and with permission from school authorities and parents/guardians of students. To measure centrality and variability of the data, the statistical tools used were the measures of central tendencies and standard deviation. On the other hand, the non-parametric Kruskal-Wallis H test and Spearman's rho under 0.05 level of significance were used for inferential analysis. Focused group discussions and journaling were also conducted to triangulate students' perception to NCAE as a decision-making reference.

RESULTS AND DISCUSSIONS
Following the higher order thinking skill (HOTS)-based Ateneo KPUP grading system, the study showed that the students have proficient (85.6%, SD=3.13) general academic performance (AP) in Grade 11. It has highest performance in the areas of humanities (89.73%, SD=2.72) and language (86.03%, SD=3.40); and lowest performance in the areas of mathematics (83.71%, SD = 4.35) and science and technology (84.41%, SD=3.18). All areas are in the proficient level of performance but not enough to transcend to the advanced level of performance.

Students' performance in the 18 specific SHS Grade 11 subjects are more dispersed than if classified per subject area. The top two highest average grades, both in high proficient category, are core subjects Personal Development (90.78%) and Physical Education (PE) and Health 2 (90.60%); while the lowest two, both in high

developing category, are specialized subjects General Chemistry 1 (80.35%) and Pre-Calculus (82.95%). The scores also appear to be more spread and discriminating in the area of mathematics with Statistics and Probability (SD=5.49) having the highest standard deviation, followed by General Mathematics (SD=4.96) and Basic Calculus (SD=4.20).

Overall AP in the 3 Applied subjects are found to be the highest with 86.53% average grade, followed by the 12 Core subjects with 86.22%. The 3 Specialized subjects in STEM accumulated the lowest average grade of 82.21%. This is consistent with the findings of Estonanto (2017) in his study of the SHS STEM curriculum. He confirmed that the subjects in SHS, most especially the ones in math and science, are more "challenging" and "tasking" as compared to that of the Junior High School. "The difficulty level of the problems is very high," he said, adding, "aside from pedagogical and logistical concerns, there must be a conscious effort to increase the acceptability of the program to its stakeholders and thereby decrease the difficulty level of the curriculum."

On the other hand, NCAE results revealed that the students have Above Average NCAE General Scholastic Aptitude (GSA) of 93.95%, which means the students are roughly in the top 7% of the total population of 1,597,438 (1,256,841 public, 349,597 private) NCAE takers in the country in 2014. 61.3% of the students are 98% and above: 48 (38.7%) of them got 99%++ while 28 (22.6%) others got 98% and 99%. It is also worthy to note that the national NCAE GSA average was 37.87% (low average) based on a report presented by Dr. Nelia Benito, Director III of DepEd, in the National Conference on the Administration of NCAE in Manila.

The high GSA aptitude level is also backed up by the students' high level of STEM Strand Preference (SSP) 90.92% which is classified as Above Average. Based on the DepEd Order 55 Series of 2016, all public school students are required to have a grade of 86% and above STEM subtest score in order for them to be allowed to enroll in the STEM academic strand. This policy was shelved though after protests from different sectors. Furthermore, all areas under GSA also generated Above Average percentile rank as shown in Table 1.

Meanwhile, the study found that there is also a significant

Table 1: Comparative results of the ADI-SMCS SHS Grade 11 students' NCAE Areas of Scholastic Aptitude and the published National NCAE percentile ranks.

Aptitude	Ateneo Average	Descriptive Classification	National Average	Descriptive Classification
General Scholastic Aptitude (GSA)	93.95%	Above Average	37.87%	Low Average
Scientific Ability (SA)	88.86%	Above Average	31.28%	Low Average
Verbal Ability (VA)	90.79%	Above Average	37.66%	Low Average
Reading Comprehension (RC)	90.02%	Above Average	46.70%	Low Average
Logical-Reasoning Ability (LRA)	89.94%	Above Average	34.80%	Low Average
Mathematical Ability (MA)	86.06%	Above Average	33.70%	Low Average

difference in the General Weighted Average (GWA) of students if classified according to NCAE GSA (p=0.00), SSP (p=0.00), and Area of Occupational Interest or AOI (p=0.031) at a significance level of 0.05.

It was also found out that there is a significant and strong positive correlation (r=0.646, p=0.00) in the GWA and the NCAE GSA of students.
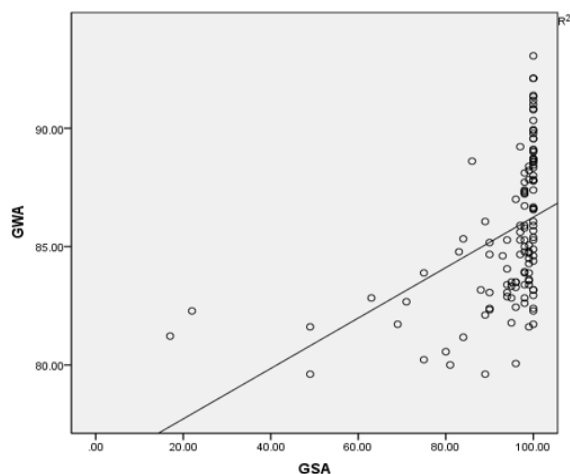
Figure 2: Scatterplot diagram of NCAE General Scholastic Aptitude and General Weighted Average grade of students.

The scatterplot in Figure 2 shows how the two GWA and GSA data sets agree to show nonlinear relationships between them. It displays a left-skewed linear representation of the data with most of the scores clumping at the right side, affirming high performance.

This affirms the results of the study conducted by Ferrer and Dela Cruz (2017) in Pamantasan ng Lungsod ng Maynila (PLM) Senior High School, and inspired by Piaget's Cognitive Development Theory.

It likewise showed positive and significant correlation between the academic performance of the Grade 11 STEM students in the first semester of school year 2016-2017 and their NCAE results. Results also showed positive and significant correlation with the NCAE score and the following subject areas: Science (r=0.292), Math (r=0.349), and English (r=0.309).
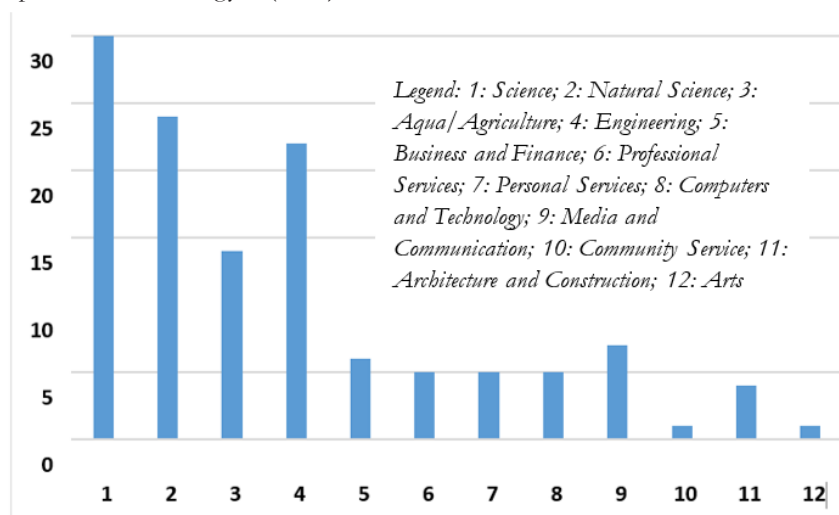
Meanwhile, significant and moderate positive correlation (r=0.564, p=0.00) was also found in the GWA and the NCAE SSP of the students as shown in Table 2. In this area, it seems that the logic behind DepEd Order 55 Series of 2016 requiring STEM hopefuls to get high SSP before enrolling in STEM strand program is further established.

Likewise, there is also a significant and strong positive correlation between the students' Area of Occupational Interest (AOI) and the students' GWA. Note that 30

Table 2: Correlational results between NCAE GSA, SSP, and AOI results and GWA of students.

Variable A	Variable B	R	p-value	Classification
General Scholastic Aptitude	General Weighted Average	0.646	0.000	+ Significant
STEM Strand Preference	General Weighted Average	0.564	0.000	+ Significant
Area of Occupational Interest	General Weighted Average	0.640	0.042	+ Significant
Reading Comprehension (RC)	90.02%	Above Average	46.70%	Low Average
Logical-Reasoning Ability (LRA)	89.94%	Above Average	34.80%	Low Average
Mathematical Ability (MA)	86.06%	Above Average	33.70%	Low Average

(24.2%) and 24 (19.4%) students chose their top 2 NCAE AOI rankings, half of the students (62 of 124) chose their Top 4-12 choices though as shown in Figure 3. As a group and considering students' choice of college course, the students logged in an average of 54.67% (Moderate) Level of Preference for the Occupational Interest. 66 (53.2%) of them prefer courses ¬¬¬¬that are linked to health and medical services, while 24 (19.4%) of them plan to take various engineering courses. The rest of the occupational areas considered were personal services, mainly, air and marine transport services, 11 (8.9%), natural sciences, 9 (7.3%), architecture and construction, 9 (7.3%), and computer and technology, 5 (4.0%).

Meanwhile, positive correlation was observed in students' performance in all the four subject areas or cluster namely Science and Technology, Mathematics, Language, and Humanities and their corresponding NCAE GSA areas. With the exemption of MA's correlation with the areas of Humanities and Language which is considered weak, the rest docketed a moderately positive correlation with SA to Mathematics (0.582), MA to Mathematics (r=0.588), and SA to Science and Technology as the most correlated. Meaning to say, as the scores in NCAE scholastic areas increase, there is high likelihood that the corresponding subject area grades and performance of the students will also rise. Positive correlation cuts across

Legend: 1: Science; 2: Natural Science; 3: Aqua/Agriculture; 4: Engineering; 5: Business and Finance; 6: Professional Services; 7: Personal Services; 8: Computers and Technology; 9: Media and Communication; 10: Community Service; 11: Architecture and Construction; 12: Arts

Figure 3: Students' chosen field versus their Area of Occupational Interest.

subjects no matter what their curricular classifications—core, applied, or specialized—are.

The results also reflect the data gathered and analyzed by Ferrer and Dela Cruz (2017) showing positive correlation between subject areas and grades and their corresponding NCAE scholastic aptitude. Although their PLM research is only limited to one semester of Grade 11 and to only three subjects (math, science, and English), it cements the findings of this study by suggesting that there is indeed a positive and significant connection in the performance between related NCAE areas and SHS subjects.

Moreover, from the Focus-Group Discussions (FGDs) and the students' journals, it was learned that they all considered their NCAE standings, despite the late arrival of the results, in choosing their strand, but not necessarily on the course they will take in college. This is consistent with the Trait-Factor Theory research of Abdullah (2016) that also showed the effectiveness of NCAE-

like assessments and interventions in "improving career maturity levels and in decreasing the career indecision levels of high school students."

In the course of triangulation, a student debater said that getting high STEM Strand Preference (SSP), GSA, and percentile scores in Scientific and Mathematical Ability convinced him to transfer from HUMSS to STEM strand which led him to stay in Ateneo instead of transferring to a school where Humanities and Social Sciences strand is offered. But the same student said he chose architecture instead of medicine (both STEM courses), his sixth and first NCAE AOI choices, respectively. Another student chose his NCAE AOI 12th choice which is computer science than the first suggested choice of taking a course in natural sciences. "I am not sure why my chosen course is ranked 11th, but I am very sure that this is my interest and I will take this course in college," he said.

A female athlete, on the other hand, is thankful of her

NCAE results as this convinced her parents to allow her to take pre-med course, instead of pursuing a business program in college. She said, "Most of my relatives are into law and business, but I really want to be in the health field. Good thing it was my Number 2 choice in the NCAE." She further confirmed that she knew three more classmates having the same "storyline" as hers.

Two female classmates, on the other hand, feel that they are happy that their childhood field of interest jives with that of their No. 1 NCAE AOI. Both have highest preference in the areas of architecture and medicine, respectively, with full green light from their parents. This also gave them the cue to stay in Ateneo (instead of going to a university) that also offers STEM strand, which, they said, is the "strand with the broadest and widest career options."

Meanwhile, for one student with no specific college course yet in mind, the NCAE results for him is just one of the many "signs" he may use in eventually deciding for the right college track. He said: "I decided to take STEM in school since I felt it (both the strand and school) is the only choice for me. Now, I am still in the exploration stage as to my career path. Who knows? I might decide to pursue law instead? I have high NCAE scores anyway." Note that this student is part of the second generation of a family of Ateneo de Iloilo-SMCS alumni.

Across all sections, it was also found out that aside from the NCAE results, the students took higher premium on their own personal choice and interest which agrees with the Holland's Theory-inspired research of Tang (2009) that says "personal interest is among the top reasons that influence the career decision making (of students), indicating a plausible rationale to warrant further examination of vocational interest and structure to enhance career intervention (in schools)."

Lastly, it is worthy to note that the other found strong factors that affect students' career decisions are practical considerations, school of choice, and preference or pressure from significant others—most especially parents, relatives, teachers, and best friends—in choosing the track, strand, and future course to take.

CONCLUSION AND RECOMMENDATION

The study, therefore, deduces that the consistent moderate-to-strong show of positive correlation between NCAE and academic performance in Grade 11 validates the efficacy of the NCAE instrument as guide in career or strand recommendation. It is also an apt working tool to be used as reference for entrance admission, academic guidance, occupational interest counseling, goal-setting and decision-making, and in approximating students' potential academic performance in Grade 11 and probably in Grade 12.

Despite this, students still consider other factors e.g. personal choice and parents in choosing their strand and their eventual course in college. Their high NCAE scores may convince a few to shift strand, but not that certainly in shifting to an area of occupational interest.

Nonetheless, the study concludes that NCAE must be taken seriously by all stakeholders—from the preparation of the instrument to the judicious conduct of the test, from the timely release of the results to the maximization of the data in schools. Students, with the help of school formators, particularly the guidance counselors, must be empowered to maximize their NCAE scores and use this as career reference in their preparation to SHS and beyond. Furthermore, this research may extend into a causal-comparative study that would attempt to once and for all statistically determine the factors affecting students' strand and career choices, and also their academic performance on both SHS and college covering more subjects in school and areas in the NCAE. It can consider intervening variables such as socio-economic status, type of school, parents' educational achievement, and the like, to add value to the study. The consideration of Donald Super's theory on personal motivation as an additional frame of reference may also add more depth to the ex post facto probe. The product of which may serve as a concrete basis in drafting a more comprehensive, career-driven, purposive, contextualized, and 21st Century-inspired guidance program in schools.

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