Vol. 6 · October 2015
Print ISSN 2244-1824 · Online ISSN 2244-1816
doi: http://dx.doi.org/10.7719/irj.v6i1.360

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by PAIR, an ISO 9001:2008 QMS certified
by AJA Registrars, Inc.

Abstract Reasoning and Arithmetic Ability Lead to Academic Success of the Accountancy Students in a Private Non-Sectarian University

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ABSTRACT

The desirable results that most Filipinos value closely associates with academic success; therefore, it is significant. The foremost goal of a university is to produce globally competitive graduates. The study explored the relationship between psychometric examination and academic performances of the Bachelor of Science in Accountancy (BSA) students in a higher educational institution; and proposed a program level intervention plan to decrease the attrition rate

of students. The study enthused on Robert Gagne's Conditions of Learning Theory, which stipulates different levels of learning. There were 56 research subjects, utilizing descriptive-correlational design. Cramer's V test was also used to examine the relationship between the two measured variables. The findings exhibited that most of the students had an average intelligence quotient and high academic performance. The results revealed that there were significant relationships between abstract reasoning and the arithmetic ability of the students to their academic performance. Thus, the Accountancy students should be given intensive academic training on disciplines and subject areas that make use predominantly of arithmetic ability and analytical skills so that they can survive the rigorous academic training in the program. The "Big Brother Culture" will be set up, wherein the students in the higher years are given authority to tutor and coach the students in the lower years.

Keywords **—** Education, intelligence, IQ, abstract reasoning, language comprehension, academic performance, descriptive-correlational design, Cebu City Philippines

INTRODUCTION

For an average Filipino, no matter how tough and financially hard it is, he or she would toil hard just to earn a college degree. School achievement is important since most people value education. This value links to the belief that those people who have a high academic degree have high propensity to acquire a stable job and financially rewarding career, compared to those who had not achieved higher education. People who have a high academic attainment have high propensity to obtain health insurance, do not rely on governmental support, have lesser probability to indulge in immoral and illegal actions, are more vigorous,and are fitter and jovial. Academic success is important because working people will need higher level of education to tackle the technologically demanding occupations of the future. In the year 2015, there is already a requirement for a postsecondary education to get a job (Regier, 2011).

Convergence in the international market and the fast evolution technologies have resulted in a highly competitive labor market. This situation necessitates a higher need for the higher education institutions to fill in the responsibility of being a molder of human resources that are marketable anywhere in the world. However, extensive evidence shows graduate unemployment, mismatches

between graduates' skills, and the demands of the industry not only in Malaysia, but all over the globe (Muk-Ngiik Wong & Hamali, 2006).

According to Ferrater-Gimena and Doming (2014), recent times have shown signs of immediate social demands for the universities to provide quality education to its primary clientele— the students. With the huge overhauling of the education system in the Philippines, such as the implementation of the K+12 Enhanced Basic Education System and Typology, higher institutions should deal with changes in its internal and even external operations to be able to survive in the educational arena.

Reform is becoming a very significant issue of the relations between society and higher education. It involves demands from society on the higher education system and the system's response. Social conditions are affected by the domains of politics, economics, science and technology and even religion. The structural changes of these domains discusses the interaction between them and their effects upon other systems including naturally, the effects upon the higher education system including Japan and other Asian neighboring countries (Arimoto, 2007).

As the landscape of higher education has in recent years undergone dramatic reforms, there is also a corresponding expectation towards the academic staff to possess the competitive background, competence. Higher education institutions are expected to provide educational services which are in demand in the job market; be competent in teaching, more research oriented and application of the entrepreneurial approach. Few of the changes encompassed the issue on the raised questions about the attractiveness of an academic career for today's graduates. Currently, knowledge has been considered as the most significant resource of contemporary economies (Enders, Musselin, Schwartzman, Teichler & Wohlute, 2013).

Higher education institutions are tasked with a special role in bridging the gap between the worlds of education and work. The European Commission (EC) has placed universities at the heart of Europe's so-called knowledge triangle of research, education and innovation, which are seen as the key drivers of a knowledge-based society. For some time now, higher education (HE) policy has had an increasingly European dimension, with its own distinct influence over national education policies. The Bologna declaration and the subsequent initiatives put HE in the center of EU policy with the goal to create a 'Europe of knowledge' (Hamburg, van der Velden & Verhagen, 2013).

The foremost goal of the university is to produce globally competitive graduates. For the College of Business and Accountancy, one of the parameters of

producing excellent graduates under the Accountancy program is a high passing rate in the Certified Public Accountants (CPA) Licensure Examinations given by the Professional Regulations Commission (PRC).

Over the years, one of the toughest exams to hurdle is the CPA Board Examinations. Though the performance of the accountancy graduates in the university is always higher than the national passing percentage, there is still a need to look into what intervention programs that can be implemented to either maintain or to increase the percentage of graduates who passed in the examinations. The starting point of this goal is to uphold the scholastic achievement of the accountancy students to prepare them for the licensure exams.

Part of the requirements for enrolment in the Bachelor of Science in Accountancy (BSA) program is an entrance examination utilizing the Otis-Lennon School Ability Test (OLSAT and Differential Aptitude Test (DAT). The Guidance Office administers both examinations to assess the student's ability to learn or to succeed in a number of different areas, such as numerical reasoning, language usage, and abstract reasoning.

Based on the data from the Office of the University Registrar, there were only 10 to 15 percent of students who took the accountancy program, who can eventually graduate. This situation also happens to other universities in Cebu and even throughout the country.

The researchers, being professors in the aforementioned course believe that it is imperative to set standards for the Accounting profession to be able to produce globally competitive accountants. The attainment of that objective starts primarily on how the students academically perform. Thus, the study is undertaken to determine if the entrance examinations results had a bearing on the academic performance of the research subjects. The findings served as basis for a proposed intervention scheme to increase the number of Accountancy students who can pass the rigorous academic training in the program, and subsequently to enable them to pass the licensure examinations.

FRAMEWORK

The study stirs on Robert Gagne's Conditions of Learning Theory. The theory specifies that there are various classifications or degrees of acquiring knowledge. The implication of these categories is that each category necessitates different and diverse kind of teaching. He recognized five main set of obtaining education: spoken communication, academic comprehension, rational tactic, psychomotor

abilities, and stance. Varying inside and outside circumstances are needed for each kind of information acquisition. For instance, to learn logical scheme strategies, there must be an opportunity to develop and rehearse novel elucidations to difficulties; to get behavior, exposure of the student to a reliable role standard or convincing (Krajewski, 2012).

He further suggested that organization of responsibilities for cognitive aptitude can be in a pyramiding consonance to intricacy: inducement identification, reply creation, abiding of rules, and utilization of vocabulary, judgments, idea conception, usage of statute, and management of drawbacks. The chief importance of the pyramiding or levelling is to point out preconditions that should be undertaken to enable learning at each stage. There are preconditions that are categorized through undertaking a job inquiry of coaching/imparting work. Studying hierarchies afford a foundation for the order of directives (Jono, Hasanordin, Ibrahim, Asarani & Aziz, 2013).

Aptitude-Treatment Interaction (ATI) is a concept that endeavors to investigate the dependence on the match between a person's individual competency and the treatment they have. When there is a match between a person's ability and the method of dealing what they received, then the outcome is considered at a maximum. A competency pertains to any quantifiable personal attributes that would have an effect in the attainment of the objective based on the model of the treatment, while treatment refers to any controllable variable based on certain situations. An interaction exits when a treatment produces effect on one type of individual and a different effect to another person (Granena & Long, 2013).

The aim of ATI research is to predict educational outcomes from combinations of aptitudes and treatments. It was summarized as: (1) aptitude treatment interactions that are very common in education, (2) many ATI combinations are complex and difficult to demonstrate clearly, and no particular ATI effect is sufficiently understood to be the basis for instructional practice. Snow states that learning style differences can be linked to relatively stable person or aptitude variables, but they also vary within individuals as a function of task and situation variables (Illeris, 2009). ATI is a research methodology that explores the interaction between proficiency, attributes, or traits and alternative instructional methods. Proficiency refers to any of the personality attributes such as mental abilities, prior knowledge, personality or cognitive styles (Yu-chu, 2012).

Learning entails obtaining and changing expertise, comprehension, approaches, values, viewpoints, and behaviors. People learn cognitive, linguistic, motor, and social skills and these may be in many forms. One criterion of learning

is it involves the change in behavior or in the capacity for conduct. A person acquires knowledge when they are adept in undertaking something different from others. At the same time, it must be remembered that learning is inferential. It is also observable that learning is not only direct but rather it should be looked on the basis of outcomes and output. Learning is assessed based on what people say, write, and do. Additionally, learning involves a changed capacity to behave in a given fashions because it is usual for a person to learn skills, knowledge, beliefs, or behaviors without demonstrating them at the time learning occurs. A second criterion is that learning endures over time. This criterion excludes temporary behavioral changes (e.g., slurred speech) brought about by such factors as drugs, alcohol, and fatigue. Such changes are temporary when there is elimination of the cause and the behavior returns to its original state. However, learning may not last forever because forgetting occurs. It is debatable how long would the classification of changes takes place, learned, but most people agree that changes of brief duration (e.g., a few seconds) do not qualify as learning. A third criterion is that learning occurs through experience (Schunk, 2012).

Proficiency pertains to the ability of a person to grasp knowledge given the proper training and developmental opportunities. It would mean that proficiency is not based on genetic factor; rather it is cogitated to be expanded capacity. Using the above definition of proficiency, the philosophical basis of the Differential Aptitude Test involves premise that human intelligence or mental ability is made up of many different levels of proficiency, and the measurement will be on the basis of varying points of view. This test consists of eight subtests that measure different aptitudes. The complete set defines a cognitive profile for each student (Corengia, Pita & Mesurado, 2013). The eight vital types of proficiency are:

(1) Verbal Reasoning test which measures the ability to see relationships among words. Forecasting achievement in educational programs utilized this kind of assessment.
(2) The Numerical Reasoning test measures the ability to perform mathematical reasoning. It is vital for success in disciplines such as mathematics, physics, chemistry, and engineering. The capability to reason with numbers is also important in many occupations, such as bookkeeping, laboratory work, carpentry, and tool making;
(3) Abstract Reasoning test is nonverbal measure of reasoning ability. It assesses how well students can reason with geometric figures or designs. The abstract reasoning score will often be vital when a course in school

and an occupation require(s) the competence to determine correlation between variables pertaining their scope, magnitude, form, location, etc. rather than among words or numbers. These fields consist of mathematics, computer programming, drafting, and automobile repair;

(4) Perceptual Speed and Accuracy test assess the capability to make comparison and mark written lists immediately with accuracy. The assessment items specifically give emphasis on measuring the speed; not on the skill;

(5) The Mechanical Reasoning Test evaluates the capability to comprehend basic mechanistic notions of machinery, apparatuses, and movements. Learners who are proficient in the mechanical field would experience ease in learning to undertake trouble shooting, fixing and running technical equipment;

(6) The space relations test assesses the adeptness of a person to picture out an object with three dimensions from the pattern with two dimensions, and to imagine how a thing would appear if rotated in space;

(7) The Spelling test measures how well students can spell common English words. The proficiency to spell is a fundamental ability required in various academic and skill-based areas;

(8) The Language Usage test determines the capacity to recognize mistakes in grammar, punctuation, and capitalization. Most jobs that require college courses necessitate high level of proficiency in language. Teachers and writers should possess high ability in this area. The Language Usage and Spelling tests are part in the DAT since the skills being evaluated are significant in various areas in the academic set up and in the actual job. The combined Verbal Reasoning and Numerical Reasoning scores are measures of general scholastic aptitude or the capacity to obtain knowledge from books and teachers (Corengia et al., 2013).

In totality, what would indeed influence intelligence? There were varying ideas pertaining to intelligence. One important contention is on the aspect of heredity vs. environment as the source of human intellect. The formats of most tests that assess intellect apply statistical analysis. Therefore, intelligence test scores predict achievement in schools quite well, at least for large groups. It also contents that those students who had achieved at least an IQ of 105 have more propensity to perform well in the classroom and subsequently, would have a high paying job in the future (Breedlove, 2015).

In the context of this investigation, the proponents explored other studies which relate to the intelligence, learning psychometric examinations and their relevance to the academic performance. Villegas and Tan (2012) conducted a study on the achievement test and their relevance to examination performance of nursing graduates. The results showed that there was a significant relationship between the IQ and reading comprehension to their board exam performance of the students. Further, it was revealed that the achievement test of the nursing graduates has no relevance to their academic performance.

In another study conducted by Tan (2013) entitled Psychometric Examination Results and Academic Performance of Irregular Students in a University, Cebu City Philippines, the results revealed that the academic performance of the students had an effect on the reading comprehension of the nursing students. Therefore, the entrance examination can be used as factor that determines their academic performance.

McNair and Johnson (2009) investigated the association of the family and school with the behavior manifested by the adolescents toward their and academic performance. The findings showed that when the adolescents had a positive view of the family and school, then the adolescents have higher tendency to attain a very good scholastic achievement. The unique contribution of the study is the reported association between contextual variables, adolescent school attitudes, and academic performance. In spite of the limitations of the investigation, findings recommended numerous proximate elements which relate to the way the adolescents look at school and the corresponding achievement, and knowing the issues related with views on success.

OBJECTIVES OF THE STUDY

The study determined the psychometric examination performance in terms of abstract reasoning; arithmetic ability; and language comprehension and general point average (GPA) of the Bachelor of Science in Accountancy (BSA) students of the university; explored the strength relationship between the students' psychometric examination performance and their general point average (GPA); and proposed a program level intervention plan to decrease attrition rate of the BSA students and attain higher passing rate in the Certified Public Accountants Licensure Examination.

METHODOLOGY

Research Design

The study applied the descriptive research design where correlation between the psychometric examination performance and the grade point average (academic performance) of the Accountancy students was measured using Cramer's V.

Research Site

The site of the study was at a private educational institution in Cebu City, Philippines. Currently, it is one of the biggest universities in the Philippines by student population. It has been known for providing quality education at low tuition fees.

Subjects

The subjects of the study were the 56 BSA students of whom 22 were First Year, 19 were Second Year, eight were Third Year and seven were Fourth Year taking BSA whose records on psychometric examination results can be found intact from the Campus Guidance Center. The study made use of quota sampling technique.

Data Sources

This study made use of secondary sources of data consisting of the psychometric reports from the entrance examination rating of the BSA graduates as per record of the Campus Guidance Center before admission to the BSA program. The proponents obtained the academic performance or the average grades of the BSA students in all subjects from the Registrar's Office. The researchers did not conduct face-to-face contact with the subjects.

Research Procedure

Before the undertaking of the study, the researchers sought permission to conduct the study from the Campus Administrator of the University. After the grant of the approval, the proponents asked the psychometric examination results of the BSA students from the Campus Guidance Center and the official final grades of the students from the Registrar's Office with the approval of the university registrar.

Statistical Treatment

In determining the psychometric examinations results and academic performance of the accountancy students, a percentage was computed. In assessing the strength of relationship between the psychometric examination results and academic performance (GPA) of the accountancy students, Cramer's V Test was utilized. The interpretation used the following scale:

Level of Association	Verbal Description	Comments
0	No Relationship	Knowing the independent variables does not help in predicting the dependent variable
.00 to .15	Very Weak	Not generally acceptable
.15 to .20	Weak	Minimally Acceptable
.20 t0 .25	Moderate	Acceptable
.25 to . 30	Moderately Strong	Desirable
.30 to .35	Strong	Very Desirable
.35 to .40	Very Strong	Extremely Desirable
.40 to .50	Worrisomely Strong	Either extremely good relationship or the two variables are measuring the same concept
.50 to .99	Redundant	The two measured variables are possibly measuring the same concept
1	Perfect Relationship	If we know the independent variable, we can perfectly predict the dependent variable

The results of data analyses comprised the foundation for formulating the proposed intervention scheme.

RESULTS AND DISCUSSION

Forty-one (41) or 73.21% of the Accountancy students had an average intelligence quotient (IQ); while there were only two (2) or 3.57% who had below average intelligence quotient (IQ). Further, there was only one student who had a superior IQ (see Table 1). Also, majority of them or 60.71% had an average abstract reasoning ability while there were only 6 out of the 56 research subjects which comprised of 10.71% who had below average abstract cognitive ability. As to arithmetic ability, one-half (50%) of the fifty-six accountancy students had an above average ability while there were only three (3), equivalent to 5.36% who had below average numerical or arithmetic ability. Further, the data also revealed

that 47 or 83.93% of the students had an average reading comprehension while 7 or 12.50% had below average reading comprehension. It is observable that none of the accountancy students had low IQ or abstract reasoning. This data supports Robert Gagne's theory wherein he stipulated several different types or levels of learning. In this theory, he identifies five major categories of learning: verbal information, intellectual skills, cognitive strategies, motor skills and attitudes (Jono et al., 2013).

Table 1. Distribution of Students' Academic Performance based on GPA

Academic Performance	Counts	Percents
Very Good	**5**	8.93
Good	37	66.07
Fair	14	25.00
Total	**56**	**100.00**

Legend:1.0= Excellent; 1.1-1.5=Very Good; 1.6-2.5= Good; 2.6-2.9=Fair; 3.0=Passing; 5.0=Failed

The result implies that the students had a difficulty of attaining excellent scholastic performance. Based on experience, majority in the Accountancy curriculum are generally difficult hard. This finding would also mean that an intervention activity should be undertaken to help the students attain excellent academic performance. Therefore, intelligence test scores predict achievement in schools quite well, like having better grades in subjects taken and having a good paying job in the future (Breedlove, 2015). Even though psychologists do not agree on what intelligence is, they do agree that intelligence, based on standard tests, relates to learning in school, solving some practical problems (Cline, Gulliford, Birch, 2015).

Table 2. Significant Relationship between the Students' Psychometric Examination Performance and their GPA

Paired Variables	Cramer's V	Strength of Relationship	Comments
Abstract Reasoning and GPA	0.2994	Moderately Strong	Desirable
Arithmetic Ability and GPA	0.3343	Strong	Very Desirable

The data showed that there was a moderate relationship between the abstract reasoning and grade point average of the Accountancy students which means that the association between the two variables is desirable. Further, the Cramer's V

value of .3343 signifies that there was strong relationship between the arithmetic ability and the grade point average of the subjects since it is within the scale of .30 to .35, in which the level of association can be interpreted as very desirable.

The finding denotes that those students who can survive in the rigorous academic training in the accountancy program are those who have abilities in making anarithmetic calculation. The data relate to the Aptitude-Treatment Interaction (ATI) of Snow which elucidated that there are teaching approaches which are considered better or less effectual to students with consideration also distinct ability of the student. ATI further discussed that maximum learning would lead when the teaching strategy fits to the learners' needs and capacity (Illeris, 2009).

On the other hand, the findings showed that there was no significant relationship between the IQ and language or reading comprehension and their academic performance or GPA, which means that those students who had a very high IQ, has the more propensity to perform better or even best academically. Hence, this affirms the idea of Carol Dwek (2013) on intelligence, who said that it refers to the capacity of the person to understand something and think about it. It considered an innate ability for perform problem solving, analyze and innovate. The language or reading comprehension was not required to attain a good academic performance in the accounting program.

CONCLUSIONS

To ensure more passers in the CPA Board Examinations, the Accountancy students are required to maintain a cut-off grade of not less than 2.0 in all their professional or major subjects during the first and second years while the cut-off grade during the third year is 2.5. Because of this system, there are only a few students who can eventually graduate without shifting or transferring to another course.

To decrease the attrition rate of Accountancy students and to attain a higher passing percentage CPA Licensure Examinations, it is recommended to decrease the academic load of to those students who experience difficulty. Strengthening of the support circle of the students should be applied primarily by the teachers who will work on during the consultation hours. This intervention activity should enable improvement in the students' performance and timely help can be given to those who experience some difficulty on the major accounting subjects.

The greater relationship between the abstract reasoning and arithmetic ability of the accountancy students suggested that the learning institution should provide

the students with extensive training in those subject areas which deal with numbers or proficiency in numerical calculation. The teaching and learning process should give emphasis on disciplines that make use of analytical competence so that they will have a greater propensity to survive in the rigorous academic training in the accountancy program. The attainment of this goal should be coupled with the effective teaching-learning activities since there are various factors that influence the learning ability of the students which is also subject to change through time. Therefore, the head of the College of Business and Accountancy should look into the curriculum and undertake relevant activities to support those students who were experiencing difficulty in their subjects taken.

TRANSLATIONAL RESEARCH

The "Big Brother Culture" will be applied. The set up permits the senior Accountancy students to conduct classes; give seat works, predepartmental examinations, and quizzes during Saturdays with close monitoring by the Dean of the College of Business and Accountancy.

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