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Research Article

Intellective Predictors of Mathematics Performance of the Freshmen Students of IICT in Isabela State University, Cauayan City Campus in the S.Y. 2008-2009

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Abstract: The research was intended to determine the intellective predictors of mathematics performance of the freshmen students of the Institute of Information and Communication Technology of the Isabela State University, Cauayan City specifically in their high school final grade in mathematics, National Career Assessment Examination numerical score in Mathematics, college entrance examination quantitative score, mental ability test.

To determine the relationship between the intellective predictors to the mathematics performance of the first year students of IICT the researcher made use of the descriptive method through documentary analysis. The respondents of his study were the freshmen students of IICT who took NCAE and college entrance test and who are taking Mathematics 11 for the second semester. The samples were selected from the four courses under the college of Information and Communication Technology namely Bachelor of Science in Computer Science (BSCS), Bachelor of Science in Information Technology (BSIT), Bachelor of Science in Information Technology–Ladderized Program (BSIT-Ladderized) and associate in Computer Technology (ACT).

Findings showed that majority of the respondents were 17 years old, 67.43% were female, 88.76% were graduated in public secondary school, 70.10% were living in rural areas, parents were undergraduate, self-employed and their monthly income ranged from 3,000-6,000. Most of the respondent's high school final grade ranged from 80-84.99, their NCAE mathematical ability score ranged from 15-50 which is low average, their college quantitative score ranged 11-15 which is satisfactory, their mental ability score ranged from 19-31 which is below average and their final grade ranged from 2.75-3.

All intellective predictors such as high grade in math, NCAE mathematical ability score and entrance test quantitative score had significant correlation in mathematics performance. With this, it is just but fitting that said findings be used by the administration as a basis for improving the curriculum so as to fully address the needs of students. This is especially true since Mathematics play a significant role in preparing and enabling young learners to become more productive members of the 21st Century society who are at par with their contemporaries from other parts of the world.

Keywords: Intellective Predictors, Mathematics Performance, Mental Ability, NCAE, Entrance Examination.

Introduction

A majority of students consider Mathematics as a complicated and difficult subject in school. This is often the case because learners are not made fully aware of why they are studying the subject. As Gijsbers, de Putter-Smits & Pepin (2019) recommended, students' beliefs about the relevance of Mathematics should be changed and this can be achieved by using authentic contexts when they are being taught. Moreover, Callaman (2014) also cited the significance of Mathematics as foundation

for many innovations, discoveries and research. This is especially true in the 21st Century when the literacy skills have evolved. As Rizki & Priatna (2019) specified, every individual should have an awareness of the role of Mathematics in the current society: that it is vital in being a social member who is constructive, caring and willing to think critically. Also, Mathematics fosters competencies such as thinking and reasoning, mathematical argumentation and communication, modeling, problem posing and solving and representation.

Trends in International Mathematics and Science Study (TIMSS) revealed that Philippine education is among with the lowest performance in Mathematics. The Manila Times (2014) reported that the Philippines participation in international surveys like the 2003 TIMSS, the country ranked 34th out of 38 countries in high school mathematics and 43rd out of 46 countries. In 2008, even with only the science high schools participating in the Advanced Mathematics category, Philippines ranked lowest among ten participated countries. For many years, Mathematics is consistently ranked last among the eight subjects in public schools according to the National Achievement Test (NAT) result, with scores not reaching the 75% passing rate. On account of this, the researchers needed to enhance the arithmetic execution of Grade-8 students in the public school under study hoping that they could determine the factors that hinder students' achievement in mathematics. Given these, it is just but normal that many experts promote the idea of contextualized learning in Mathematics. Nonetheless, there remain various factors that affect the learning and performance of Mathematics among students. Due to this, researchers have dedicated many studies to determine which affect the attitude, learning and performance of students in Mathematics.

Marasigan (2019), for an instance, found out that while students' high school average had no significance to their academic performance in college, the entrance examination results had bearing. It was concluded, therefore, that admission tests are indicators of performance. After all, it has always been a general observation that admission examinations and standardized tests have the ability to not only evaluate but also to predict the performance in major subject areas such as English, Mathematics and Science.

Most researchers have gone toward this aspects and found meaningful information pertaining to the predictors. Most of them considered intelligence quotient, type of school they graduated from, type of community where they spent most of their time and their general average to be directly, through minimal, related to the performance of the learner. This is something that educators should be more aware of since it is their sworn duty to ensure and provide quality education. Moreover, since students' performance is developed at large on what they learn in school, the school administrators and teachers must also strive for continuous faculty development programs to ensure teachers' competencies in teaching. As Mrayyan (2016) stated, teachers provide the stimuli in creating an effective learning climate for their students. In Mathematics, this signifies that the teacher should be knowledgeable not only about the subject matter but should also know how to foster creative and critical thinking, problem-solving and analysis. Furthermore, the teacher should also know how to properly investigate and assess the learning of the students.

These concepts are the basis for the conception of this study. The researcher recognizes the issue of poor performance in Mathematics and he knows how this affects their future as members of the community. With this, the researcher aims to determine the relationship of some variables in relations to the Mathematics performance of the freshmen students of the Institute of Information and Communication Technology for the School Year 2008-2009.

Objectives of the Study

The study was intended to determine the predictors of Mathematics performance of the freshmen students of the Institute of Information and Communication Technology for the School Year 2008-2009. More specifically, the study aims to:

1) Determine the performance of the respondents in terms of:

a) High school final grade in Mathematics
b) College entrance examination quantitative score
c) Mental ability test
d) Mathematics 11 final grade

2) Identify the intellective predictors of Mathematics performance of the first year students of the Isabela State University Cauayan Campus in terms of:
a) High school final grade in Mathematics
b) NCAE numerical score in Mathematics
c) College entrance examination quantitative score
d) Mental ability test

3) Determine if there is significant correlation between the intellective predictors and the mathematics performance of the freshmen students of IICT.

Methods of Research Used

In order to determine the relationship of high school final grade in Mathematics, NCAE Mathematical ability score and college entrance test qualitative score to the Mathematics performance of the first year students of the Institute of Information and Communication Technology of ISU-Cauayan Campus, and to secure adequate and reliable information for evaluation of the objective of the study, the researcher made use of descriptive method through documentary analysis and inferential method of research.

Respondents of the Study

The respondents of this study were the freshmen students of IICT who took NCAE and College entrance test in 2007 and 2008 and who are taking Mathematics 12 for the second semester 2008-2009. The samples were selected from four courses under the College of Computing and Information Technology namely Bachelor of Science in Computer Science (BSCS), Bachelor of Science in Information Technology (BSIT), Bachelor of Science in Information Technology–Ladderized Program (BSIT-Ladderized) and Associate in Computer Technology (ACT). In determining the sample size of the population the Slovin's formula was used.

Table 1. Frequency Distribution of Respondents by Course

Course	No. of First Year Enrolled	Number of Samples	Percentage
BSIT	92	47	24.23 percent
BSIT-Ladderized	103	53	27.32 percent
BSCS	44	22	11.34 percent
ACT	140	72	37.11 percent
Total	379	194	100 percent

Table 1 shows the frequency and percentage distribution of the respondents by course. It shows that majority or 37.11percent of the respondents were from Associate in Computer Technology.

Data Gathering Tools

The researcher used reliable tools and valid instruments to produce reliable output namely: Students Registration Form, Entrance Test Form, Form 138, OLSAT, Grade sheets and Mathematics attitude scale.

Student Registration Form

This was given to the freshmen students. The profile of the respondents was obtained in this form.

Entrance Test Form
The college entrance test quantitative soccer of the respondents was obtained in this form.

Form 138
The high school final grade of the respondents in Math was taken from this form.

Otis-Lennon School Ability Test (OLSAT)
This is one of the standardized test which is designed to measure students' mental ability.

Grading Sheet
This is the tool used in getting the grades of the respondents in Mathematics 11.

Statistical Treatment of Data
The data gathered were treated statistically using frequency and simple percentage distribution. This was used in the profile of the respondents and Person's Product Moment Correlation which was used to determine the correlation between the intellective variables and Mathematics performance.

Results and Discussions

Table 2. Frequency and Percentage Distribution of the Respondents according to their High School Final Grade in Mathematics

Grade	Interpretation	Frequency	Percentage
95-99.99	Outstanding	1	.51%
90-94.99	Very Satisfactory	14	7.22%
85-89.99	Satisfactory	67	34.54%
80-84.99	Fair	89	45.88%
75-79.99	Poor	23	11.85%
Total		194	100%
Mean Grade = 83.90			

The table shows that there is only one or 0.51 percent of the respondents who was able to get an outstanding performance in their high school grade in Math; 14 students or 7.22 percent who performed very satisfactory; 67 or 34.54 percent who has satisfactory performance; and 23 or 11.85 percent with poor performance.

Further analysis shows that the level of performance obtained by the students in their high school final grade in Math is 83.90 which indicate fair performance. This also implies that high school grade in Math is a strong predictor of Mathematics performance. Furthermore, as reported by Hodara & Lewis (2017) and Hein, Smerdon & Sambolt (2013) high school grade point average as well as the skills they learn therein is a strong predictor of performance in college level subjects, particularly in subjects like Mathematics and English.

Table 3. Frequency and Percentage Distribution of the Respondents according to their Performance in the National Career Assessments Examinations (NCAE)

Score Range	Interpretation	Frequency	Percentage
86-97	Above Average	2	1.03%
51-85	Average	56	28.87%
15-50	Low Average	126	64.95%
3-14	Below Average	10	5.15%
Total		194	100%

The table shows that out 194 respondents, 2 or 1.03 percent have above average performance in the NCAE and 56 or 28.87 percent performed as average. Students whose performance is below average has a frequency of 10 or 5.51 percent and 126 or 64.95 percent has low average performance. The data indicates that a majority of the respondents performed at a low average in the NCAE.

This kind of data is particularly useful since it can be used as a basis for remediation and student support in the college level. Nonetheless, it should be also be noted that there have been various studies which show that not all conventional standardized tests do not necessarily fully predict or indicate Mathematics performance (Karta, Dunya, Diefes-Dux & Zawojewski, 2015).

Table 4. Frequency and Percentage Distribution of the Respondents according to the Grade Obtained in the College Entrance Test Quantitative Score

Score Range	Interpretation	Frequency	Percentage
21-25	Outstanding	3	1.03%
16-20	Very Satisfactory	38	19.59%
11-15	Satisfactory	82	42.27%
6-10	Fair	62	31.96%
1-5	Poor	9	4.64%
Total		194	100%
Score Mean = 21.05			

The table shows that the score mean and the level of performance obtained by the respondents is 12.05. This indicates that students' performance in the entrance test quantitative score is satisfactory. Again, as aforementioned, it is important for higher education institutions to know and understand the relationship between the learners' entrance examination performance and their academic performance later on in college (Wang & Lee, 2004).

On the other hand, HEIs should also have the discretion to realize that the entrance or admission tests do not fully reflect student performance (Atento, 2011).

Table 5. Frequency and Percentage Distribution of the Students according to their Mental Ability Score

Stanine	Interpretation	Frequency	Percentage
9	Superior	0	0
7-8	Above Average	0	0
4-6	Average	74	38.14%
2-3	Below Average	93	47.94%
1	Low	27	13.92%
Total		194	100%

It can be gleaned from the table that out of 194 students, there were 74 or 38.14 percent who got an stanine score ranging from 4-6 which is low, 43 or 47.94 percent of the students got an stanine score ranging from 2-3 which is below average, and 27 or 13.92 percent got a score of 1 which is low.

The data further show that majority of the students have below average mental ability score and none of the students garnered an above average or superior score.

This finding is crucial as studies by Petrides, Frederickson & Furnham (2004) as well as Meenu (2016) proved that there is a high correlation between mental ability and school performance.

Table 6. Frequency and Percentage Distribution of the Respondents according to the Grade Obtained in the College Entrance Test Quantitative Score

Score Range	Interpretation	Frequency	Percentage
1.25-1.5	Outstanding	1	.52percent
1.75-2.0	Very Satisfactory	39	20.20percent
2.25-2.5	Satisfactory	50	25.77percent
2.75-3.0	Fair	99	51.30percent
4.0-below	Poor	5	2.58percent
Total		194	100percent
Weighted Mean = 2.58			

The data above illustrates that only one or .52 percent of the respondents achieved an outstanding performance in their college entrance tests. There were 39 or 20.20 percent of the respondents who performed very satisfactorily. 50 or 25.77 percent had satisfactory performance; 99 or 51.03 percent had fair performance; and 5 or 2.58 percent had poor performance. Further analysis shows that the level of performance obtained by the students in their Mathematics 11 is 83.90 which fair performance. In the study of Vanderheyden & Burns (2009), they indicated that the utility of curriculum-based assessment and measurement are proven and effective estimates of Mathematics performance especially in the retention of skills students are expected to learn and retain.

Table 7. Correlation between High School Final Grade in Math and Mathematics Performance of the Freshmen Students of IICT

Variables	Coefficient Correlation	Computed t-Value	Critical Value	Level of Significance	Interpretation
High school Grade in Math	0.62	Accepted Value 1.96	1.96	.05	Significant
16-20		38			

Table 7 show a coefficient of -0.62 which signifies strong negative correlation. The computed t-value for the correlations which is 10.92 is greater than the critical value of 1.96. Therefore, the null hypothesis is rejected. This further implies that there is a significant relationship between high school grade in Math and Mathematics performance. Studies by Brown, Halpin & Halpin (2015) and Klein (2003) also shared the same conclusion in their respective studies, citing the principle that prior knowledge is significant in determining the future performance of students in the college level.

Table 8. Correlation between the National Career Assessment Examination and the Mathematics Performance of the Freshmen Students of IICT

Variables	Coefficient Correlation	Computed t-Value	Critical Value	Level of Significance	Interpretation
NCAE (x)	-0.54	Accepted	1.96	.05	Significant
Math Performance		Computed			

The coefficient correlation obtained -0.54 which was subjected to t-test to determine if there exist a significant correlation between the obtained t-value which was 8.96. The absolute t-value was found greater than the critical value of 1.96 which shows that correlation is significant at 5 percent level. It indicates that students performance in NCAE have significant correlation with performance in Mathematics. As Schneider & Mather (2015) explained, standardized achievement tests are primarily designed to evaluate skills, knowledge and performance in core academic areas; hence it is no surprise that results from these tests are capable of predicting performance.

Table 9. Correlation between the College Entrance Test Quantitative Score and Mathematics Performance

Variables	Coefficient Correlation (r)	Computed t-Value	Critical Value	Level of Significance	Interpretation
Entrance Test Quantitative (x)	-0.523	Accepted Value 1.96	1.96	.05	Significant
Math Performance (y)		Computed Value 8.50			

Table 9 reveals a coefficient of correlation of -0.52. The computed t-value for correlation is 8.50 which is greater than the critical value of .50 level of significance. This implies that there is a significant relationship between the college entrance test quantitative score and Mathematics performance. Therefore, entrance test quantitative score is a predictor of Mathematics performance mental ability score is one of the predictors of Mathematics performance. Studies by Gómez-López, Rosales-Gracia, Marín-Solórzano, & Josefina Guzmán-Acuña, (2012) as well as Sebastian & Sebastian (2014) also concluded the same thing.

Conclusions

The results of the study indicate that the variables: High school final grade in Mathematics, college entrance examination quantitative score, mental ability test and Mathematics 11 final grade have significant relationship with the respondents' Mathematics performance. This signifies that all of the aforementioned are predictors or indicators of academic performance in the area of Mathematics. With this, it is just but fitting that said findings be used by the administration as a basis for improving the curriculum so as to fully address the needs of students. This is especially true since Mathematics play a significant role in preparing and enabling young learners to become more productive members of the 21st Century society who are at par with their contemporaries from other parts of the world.

Recommendations

With the results of the study, it is highly recommended that further studies of the same nature be conducted in other colleges of the university so as to allow for validation and to determine whether all the students therein face the same issues in their learning. Future research should also examine and review if the existing curriculum for the different courses addresses the skills needed by the learners.

Conflicts of interest

There is no conflict of interest of any kind.

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