Knowledge E
Engaging minds

Conference Paper

The Entry Mathematics Performance of the Bachelor of Science in Industrial Technology in Ilocos Sur Polytechnic State College

Jonathan L. De La Cruz

Ilocos Sur Polytechnic State College

Abstract

Mathematics is an interesting but a very challenging subject. Several studies reported different factors which lead to students' poor performance in this subject. This study generally aimed to assess the entry mathematics performance of the Bachelor of Science in Industrial Technology. Specifically, the study aimed to determine the influence of the student's profile, attitudes and beliefs towards mathematics and the student's impression to mathematics teachers towards their entry mathematics performance. It employed the descriptive-correlational research design. The findings revealed that the level of the entry mathematics performance of the students was good. It was disclosed that students have a positive attitude and beliefs towards Mathematics and impressions to Mathematics teachers. Students who have shown positive attitude, beliefs and impressions to Math teachers tend to perform better. Hence, performance in Mathematics can be improved by developing a positive attitude and beliefs of students towards the subject.

Keywords: Industrial Technology, Intervention Plan, ISPSC, Mathematics Performance

Corresponding Author:
Jonathan L. De La Cruz
drjonathandelacruz12@gmail.com

Received: 23 April 2018
Accepted: 8 May 2018
Published: 4 June 2018

Publishing services provided by Knowledge E

Selection and Peer-review under the responsibility of the IRCHE 2017 Conference Committee.

1. Introduction

Mathematics as one of the core subjects plays a significant role in our everyday life. It is not confined alone in acquiring numeracy and accuracy skills. It helps us develop connections and understanding of the world.

The Ilocos Sur Polytechnic State College as a higher learning institution is envisioned for total human development. To achieve this vision, the College is mandated to perform its mission through its continued assessment of programs, projects and most especially the delivery of instruction.

Assessment of learning is a continued process to attain quality education. This process can is big help for the institution to determine the level of preparedness of students for mathematics and math-related courses. The result of assessment can offer the teacher evidences of the students' mathematical knowledge, strategies, and ability to communicate mathematically. Results can be used as inputs to develop and enhance the curriculum.

The Philippine Secondary Mathematics includes review of basic mathematics, algebra, geometry, trigonometry, and probability and statistics. In the tertiary level, a 6-unit general education in mathematics is mandated for all baccalaureate degrees which include college algebra and trigonometry.

Mathematics was associated with achievements on fitting information within a historical context. 68% of students with college level mathematics competency met the standards, 57-58% of students whose competency was at the level of intermediate algebra or for whom there is no mathematics information met standards, and 52% of students with remedial mathematics met standards [1].

A study on the mathematics competencies was at West Visayas State College for the School 2008-2009. A random sample of 400 freshmen was used. Findings revealed that the students have mastered on Basic Mathematics such as addition of numbers with scientific notations, evaluating exponential expressions of fractions, and applications of ratio and proportion. On the other hand, students showed weak data analysis and math problem solving [2].

Learning assessment program that measures academic competencies is important to improve the teaching of mathematics in the college. This study is prepared to assess their level of quantitative preparedness for college work.

In the Ilocos Sur Polytechnic State College particularly in the Institute of Technology, data shows that students found difficulty in this subject as evidence by their low grades which lead to a negative attitude towards mathematics.

It is at this reason that the researcher does an initiative to study factors related to mathematics performance of the students enrolled in the Bachelor of Science in Industrial Technology (BSIT). The result of this study would be an input for the teachers as transmitters of knowledge to implement interventions that will eventually improve the delivery of learning in the college.

The study was conducted during the school year 2016 - 2017 at the Ilocos Sur Polytechnic State College, Santiago Campus, Santiago, Ilocos Sur.

2. Objectives of the Study

Generally, this study assessed the entry mathematics performance of freshman students of the Bachelor of Science in Industrial Technology, which served as an input for an intervention plan. Specifically, this study aimed to describe the respondents' profile in terms of sex, age, the type of school graduated from, attitudes towards mathematics, mathematical beliefs and their impression to their high school mathematics teachers; to determine the level of the their mathematics performance; and to determine the significant relationship between the profile of the respondents and their mathematics performance.

3. Materials and Methods

3.1. Research design

The descriptive method of research was used to assess the entry mathematics performance of the Bachelor of Science in Industrial Technology of the Ilocos Sur Polytechnic State College, for the School Year 2015-2016. The research design is a combined description and correlation design where theories or concepts gathered were used to describe a certain phenomenon and were subjected to see significant associations. Its main data gathering tool is a survey questionnaire used in describing the variables in the study. Moreover, this included correlation between variables to see significant relationships that affect one variable to another. The profile of the student-respondents in terms of age, sex, school graduated from, attitudes and beliefs towards mathematics and impressions of students towards their mathematics teachers during high school were correlated to their entry mathematics performance.

3.2. Respondents of the study

The respondents in this study were the eighty-seven (87) BS Industrial Technology students of ISPSC who took up the admission test of the college on May – June 2016.

3.3. Data gathering instrument

There were two instruments used in this study. First, the questionnaire was the basic tool used to gather the profile of the respondents, the attitude and beliefs towards

mathematics and their impression to their high school mathematics teachers of the respondents. Second, the mathematics component of the ISPSC Admission Test was used to gather data on the performance of the BS Industrial Technology students in mathematics.

3.4. Statistical treatment of data

The data gathered were encoded, tallied, interpreted and analyzed using the Microsoft Excel. The following descriptive statistics was the main tool used in this study.

1. Frequency count and percentage was used to describe the personal profile of the respondents on age, sex and type of school graduated from.

2. The mean was used to describe the attitude of the students towards mathematics, mathematics beliefs, impressions to mathematics teachers and the performance of the students in mathematics.

3. The Simple Linear Correlation Analysis was used to determine the significant relationship between the profile, attitude, beliefs and impression to mathematics teachers and the entry performance of the BSIT students in mathematics.

4. Results and Discussion

Table 1 presents the profile of the respondents in terms of sex, age and type of school graduated from.

4.1. Sex

Dominating the table in terms of sex is male with 81 or 93.10% of the total. Only a few (6 or 6.90%) are female. The female respondents on the hand have 6 or 6.90%. This means that there are more male students who are attracted to Industrial Technology Education than female students. This finding negates that of the reports in the Overview of the Philippine Education that there are more females than males in the higher education.

Table 1: Profile of Respondents.

Profile	f	%
Sex		
Male	81	93.10
Female	6	6.90
Total	**87**	**100.00**
Age		
16-18	57	65.52
19-21	21	24.14
22-24	4	4.60
25-27	1	1.15
Total	**87**	**100.00**
Type of School Graduated		
Public	**71**	81.61
Private	**16**	18.39
Total	**87**	**100.00**

4.2. Age

The respondents are predominantly aged 16-18 with 57 or 65.62%. Twenty-one or 24.14% are aged 19-21. This means that the respondents are of normal ages for higher education.

4.3. Type of school graduated

The table further shows the distribution of respondents by the type of school graduated from. It can be gleaned that majority of the students enrolled in the Bachelor of Science in Industrial Technology graduated in the public schools with seventy one or 81.61%. Only sixteen or 18.39% graduated from the private schools. This implies that students of the public schools are more attracted to Industrial Technology or Technical Vocational courses than those students graduated in the private schools.

Table 2 shows the entry performance in mathematics of the Bachelor of Science in Industrial Technology Students. It can be seen that 42 or 48.28% of the students obtained scores ranging from 11-15 with a descriptive rating of Good. The group is followed by those with scores within 11-15 or Fair level, Students with scores 16-20 tallied 10 making 11.49% of the sample. None of the students obtained a score lower than 6 or at Poor level. Only two or 2.30% of the respondents obtained a remarkable score from 21 to 25.

Table 2: Entry Mathematics Performance of BS Industrial Technology Students.

Range of Scores	DR	f	%
21-25	Excellent	2	2.30
16-20	Very Good	10	11.49
11-15	Good	42	48.28
6-10	Fair	33	37.93
0-5	Poor	0	0.00
TOTAL		87	100.00
Mean		11.93	
DR		Good	

In the overall, the entry performance of the students is good as evidenced by the mean rating of 11.93. This means that the performance of the students is still on the acceptable level. However, the mean average indirectly states that the mathematics performance of the students needs to be enhanced to achieve a higher level. A set of interventions to improve their performance is required and should immediately be done by mathematics instructors.

Table 3 presents the item mean ratings showing the attitude of students towards mathematics. All the items were rated at **moderately agree** level. The items with the highest means are they are happier in Mathematics than in any other subject with a mean of 3.31, feel at ease in Mathematics class with a mean of 3.22, feel definite a positive reaction to Mathematics with a mean of 3.10, enjoy seeing how rapidly and accurately when he/she works out problems with a mean of 3.02, and mathematics is something in which they enjoy great deal with a mean of 3.00. On the other hand, items with the lowest means include mathematics is as important as any other subject with a mean of 2.63, mathematics is an interesting subject with mean of 2.69, mathematics is a subject in school which I have enjoyed studying with mean of 2.85, they really like mathematics with a 2.87 and Mathematics is fascinating and fun with a mean of 2.87.

The respondents believe that they have a **positive** attitude towards mathematics as evidenced by the computed mean of 2.95. This signifies an affirmative perception of the students towards the subject area. Students perceived Math as an important subject with equal relevance to the other subjects. They just found the subject somewhat difficult at times which brings a diminished interest and confidence [3].

Table 4 presents the item mean ratings on the mathematics beliefs of students along self-confidence. All the items were rated at **moderately agree** level. Items with highest means are "I trust myself in mathematics" with a mean of 3.39, "I know that I can be successful in Mathematics" with mean of 3.38 and "I am able to get a good mark

Table 3: Attitudes of Students Towards Mathematics.

Indicators	**Mean**	**DR**
1. Mathematics is very interesting to me.	2.69	MA
2. Mathematics is fascinating and fun.	2.87	MA
3. I enjoy seeing how rapidly and accurately when I work out math problems.	3.02	MA
4. Mathematics is something which I enjoy great deal.	3.00	MA
5. I really like mathematics.	2.87	MA
6. Mathematics is a subject in school which I have enjoyed studying.	2.85	MA
7. I am happier in Mathematics than in any other subject.	3.31	MA
8. I feel at ease in a Mathematics class.	3.22	MA
9. Mathematics is as important as any other subject.	2.63	MA
10. I feel a definite positive reaction to Mathematics.	3.10	MA
Overall Mean	**2.95**	P

Table 4: Mathematics Beliefs along Self-confidence.

Indicators	Mean	DR
I am the type of person who is good in mathematics.	2.97	MA
I am able to get a good mark in mathematics.	3.13	MA
I can do difficult mathematics tasks.	3.05	MA
I trust myself in mathematics.	3.39	MA
I know that I can be successful in Mathematics.	3.38	MA
Overall Mean	3.18	P

in mathematics" with a computed mean of 3.13. Moreover, items "I can do difficult mathematics tasks (3.05)" with a computed mean of 3.05 and "I am the type of person who is good in mathematics" with a mean of 2.97 rated the lowest. Generally, the

respondents believe that they have a **positive** level of self- confidence as evidenced by the overall mean of 3.18.

Table 5: Mathematics Beliefs Along Success Orientation.

Indicators	Mean	DR
The most important in learning mathematics is to understand.	3.99	A
I prepare myself carefully for the tests.	3.89	A
In mathematics, one will be successful with diligence.	3.41	A
For me, it is very important to get a good mark in Mathematics.	3.83	A
I am anxious before mathematics tests.	3.16	MA
Overall Mean	3.65	HP

Table 5 presents the item mean ratings showing the mathematics beliefs of the respondents along success orientation. Four of the items were rated **agree**. These are "the most important in learning mathematics is to understand" with a mean of 3.99, "careful preparation for the test" with a mean of 3.89, it is important to get a good mark in Mathematics with a mean of 3.83, and "in mathematics, one will be successful with diligence" with a computed mean of 3.41. In addition, the respondents **moderately agree** that they are anxious before mathematics test with a mean of 3.16. In general, the respondents have a **high** level of mathematics beliefs along success orientation with a mean rating of 3.16.

Table 6 presents the mathematical beliefs of the respondents along defense orientation. All the items were rated at **moderately agree** level. The items "In mathematics, one does not need to understand everything when he gets only good marks in tests" and "I don't want to reveal others, if I don't understand something in mathematics" obtained the highest means of 3.15 and 3.11, respectively. Meanwhile, the items that obtained the lowest include "I don't like tasks that I am not able to solve immediately" with a mean of 2.87, "I answer in mathematics class only if I am compelled to" with a mean of 2.99 and "I fear often to embarrass myself in Mathematics class" with a mean of 3.07. In the overall, the respondents believe that they have a **positive** level of mathematics beliefs along defense orientation as manifested in the computed mean rating of 3.04.

Table 6: Mathematical Beliefs Along Defense Orientation.

Indicators	Mean	DR
1. I don't want to reveal others, if I don't understand something in mathematics.	3.11	MA
2. In mathematics, one does not need to understand everything when he gets only good marks in tests.	3.15	MA
3. I fear often to embarrass myself in Mathematics class.	3.07	MA
4. I answer in mathematics class only if I am compelled to.	2.99	MA
5. I don't like tasks that I am not able to solve immediately.	2.87	MA
Overall Mean	3.04	P

Table 7: Summary of Mathematics Beliefs along the Three Sub-scales.

Sub-scales	Mean	DR
Self- confidence	3.18	P
Success orientation	3.65	HP
Defense orientation	3.04	P
Grand Mean	3.29	P

The highest mean rating among three the sub-scales is on success orientation with a computed mean of 3.65 and self-confidence with a mean of 3.18 described as **highly positive** and **positive**, respectively. Moreover, the sub-scale on defense orientation with a mean of 3.04 obtained the lowest described as **positive**. In the overall, the data shows that the respondents have positive beliefs in mathematics as evidenced by the computed mean of 3.29. This suggests that students believe that mathematics is an important discipline or subject for them to be successful in life.

Table 8 presents the impression of the respondents to their mathematics teachers in the secondary level. The items with the highest means are "explains the subject matter thoroughly" with mean of 4.06, "practices good time management" with mean of 3.99, "reports regularly" with mean of 3.95, "respect individual differences of the students" with mean of 3.95, and "maintains proper attire" with mean of 3.94. Moreover, the indicators with the lowest means are "teachers use varied instructional materials" (3.49), "applies the content of the subject matter" with a mean of 3.72, "motivates

Table 8: Impression of Students to Mathematics Teachers.

Indicators	WM	VI
1. Explains the subject matter thoroughly.	4.06	A
2. Uses varied instructional materials.	3.49	A
3. Shows high interest and motivation in teaching the subject.	3.87	A
4. Applies the content of the subject matter.	3.72	A
5. Motivates students and direct their attention to the subject matter.	3.82	A
6. Demonstrates good sense of humor.	3.85	A
7. Practices good time management.	3.99	A
8. Uses good command of the language.	3.83	A
9. Implements proper discipline to students.	3.90	A
10. Applies guidance in evaluation skills.	3.90	A
11. Maintains eye to eye contact when talking with the students.	3.82	A
12. Maintains proper attire.	3.94	A
13. Reports regularly.	3.95	A
14. Respect the uniqueness of the students.	3.95	A
15. Encourage to learn beyond what is required.	3.92	A
Overall Mean	3.87	H

students and direct their attention to the subject matter" with a mean of 3.82, and "uses good command of the language" with a mean of 3.83. All the indicators included along impressions to mathematics teachers were all rated agreeable. In the overall, the computed mean rating of 3.87 shows that the students have high positive impressions to the mathematics teachers. The result implies that mathematics teachers show professionalism and proper decorum in the practice of their teaching career which made them very impressive and extraordinary before their students.

It can be noted from the table that there are only two profile factors which posted significant correlation to the entry mathematics performance of Bachelor of Science in

Table 9: Correlation Between Student Related Factors and Entry Mathematics Performance.

Profile	Pearson Correlation (r)	Significance
Age	-0.07	p>0.05
Sex	-0.06	p>0.05
School Graduated From	0.11	p>0.05
Attitudes Towards Mathematics	0.62	p<0.05
Mathematics Beliefs	0.52	p<0.05
Impression to Mathematics Teachers	0.14	p>0.05

Industrial Technology students. Attitudes towards mathematics, with r = 0.62, is positive and significantly correlated to the performance of the students. Aside from attitude towards mathematics, the mathematics performance of the students is affected by their mathematics beliefs. The relationship between these two variables is represented by r = 0.52, a positive and significant relationship. The findings of the present study concerning the relationship between math achievement and attitudes towards mathematics are consistent with research showing that good achievers develop more positive attitudes than lower achievers. Achievement is usually related to self-belief in competence and self-belief in competence can be related to attitudes towards math, which suggests that when students succeed at a math task, it increases their sense of competence and this may promote more positive attitudes. Lack of student motivation and engagement in academic work is an issue of concern amongst teachers. Attitudes are deeply related to motivation and social support. It is believed that developing strategies in educational contexts, to improve teacher support and student engagement could be of vital importance in improving not only attitudes but also mathematical performance among students throughout their schooling [4].

5. Conclusion

1. Majority of the student- respondents are male, ages 16-18 and graduated from the public secondary schools.

2. The students have displayed positive attitudes towards mathematics, mathematics beliefs and impressions to mathematics teachers. They are able to acknowledge the relevance of the subject to oneself and the contributions of the mathematics teachers in imparting knowledge and skills.

3. The entry mathematics performance of the students is **Good**. However, a significant number of "Very Good" students were noted.

4. Students with higher and positive attitudes and beliefs towards mathematics performed better than students with lower attitudes and beliefs.

6. Recommendations

1. Mathematics instructors may seek updates with current and newest trends and motivational strategies in teaching mathematics to increase the motivational level of the students and help them develop confidence in dealing with mathematics problem.

2. Mathematics instructors may develop positive attitude with students and focus more on classroom activities, which will involve active teaching- learning process and students' participation in the class.

3. Mathematics instructors may organize periodic seminars, workshops and math olympics for students designed to promote positive attitudes and belies of students towards mathematics.

4. Mathematics instructors may provide immediate interventions towards the advancement of the level of mathematics performance of the students. There should be a positive learning environment so that students can develop a positive attitude towards the subject which would lead to better performance. The use of technology, varied teaching strategies, peer tutoring and collaborative learning approaches are highly commendable.

References

[1] Bers, T. (2001). Assessing the Achievement of General Education Objectives: Three Years of Assessment. Office of the Research Oakton Community College.

[2] Nepomuceno, C.T. (2009). "Entry Mathematics Competencies of West Visayas State University Freshman" Institutional Research. West Visayas State University, Iloilo City.

[3] Cabatay, Henry I. et al. (2011). Predictors of Academic Success and Achievement for College Algebra.

[4] Mata, M.L., Monteiro, V., Peixoto, F. (2012) Attitudes towards mathematics: effects of individuals, motivational, and social support factors. Hindawi Publishing Corporation Child Development Research Volume 2012