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Factors Affecting Level of Interest of Bachelor of Secondary Students towards Mathematics as Field of Specialization

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***Abstract*—Settling on the major field of specialization is a great concern for Bachelor of Secondary Education students because there are a lot of factors that need to be considered: Teachers, subject, school, peer/social, and self. This study aims to determine which of the given factors affect the student's decision in selecting Mathematics as a field of specialization. This study used comparative descriptive survey methods of research. The respondents were the 71 first year Bachelor of Secondary Education students. The data gathered were analyzed using the following statistical tools: Frequency counts, mean, standard deviation, skewness, kurtosis, and z-test. Teacher-related, subject-related, and self-related factors are important considerations why students chose mathematics as their specialization. Said factors also positively affect the performance of the students in Algebra.**

Keywords—Aspect Touching Attention, Math Education

I. INTRODUCTION

Each year mathematics teachers of Pangasinan State University Bayambang Campus encourage the incoming 2nd-year students to select mathematics as their field of specialization to increase the number of students who take math as their major. The question is how they will encourage students to take math as their field of specialization? What are the bases of the students in selecting a field of specialization?

Some students were asked why they take math as their specialization and why they would not take math as their specialization, they gave different reasons. From the answers, (facts) the following factors that affect their interest to take math as their specialization was derived. These were the teachers, subject, school, peer/social factor and about their self. In this study, those factors were included because of the following reasons: a) teachers' play a vital role to influence students to take math as their specialization. Teachers would improve the atmosphere of classrooms so that students may be motivated to acquire the essential foundation in that course. If they were motivated everything well follows, their attitude towards the course would improve, and they will enjoy studying math. According to Natsir and Anisati (2015), teachers need a variety of efforts to achieve successful teaching. The teachers and the learners were the main determiners for improving learners' performance.; b) If students have a better attitude towards the mathematics, then it has a greater chance to take the course.; c) If the school has sufficient equipment, facilities in math and pleasant atmosphere might encourage students to take math as their course. d) Their self-was included as a factor because if they have a positive perception towards the course, they will not hesitate to take math as their major. According to Richards (2010), students can identify factors that affect how they think and feel about mathematics, and they have ideas about how the process of teaching mathematics could be modified to improve student learning.; and e) Lastly, peer/social factor is included to clear the issue "students who have high performance in algebra they take/shift to another course". From this situation, it was assumed that they might be influenced by their friends, classmates, relatives, family, etc.

In this study, the teachers and students and school will be benefited. The teachers would be given a direction to influence students to select their field of specialization. The strengths and weaknesses of the teachers and the school would be identified. The

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students would be given an opportunity to evaluate their interest towards math subjects, to the school and their teachers. Thus, it is necessary that all the factors that contribute to better learning in mathematics should be so favorable that the students may learn better and enjoy studying mathematics concepts, properties, theorems and facts about math.

Rešić, Ahmetbegović & Škrobić (2012) stated some of the negative perceptions of the students about mathematics. According to them, students consider mathematics subject boring, and students do not want to learn it intensively. Despite these negative characteristics of mathematics, they were still believed that mathematics could greatly help them in studying through life. According to Monoranjan & Bharati (2013), the low performer students, their attitude towards mathematics is fairly positive. This implies that there still room for improvement to increase the interest of the students' in mathematics. Sharbrough (2006) found out that higher levels of interest are linked to higher performance. It is interesting to notice. Therefore, that high level of interest can result in higher performance that will nurture interest in the students.

Indonesian ordinances concerning teachers (Law No 14 of 2005 of the Republic of Indonesia and Indonesia – MONE's Regulation No 16 of 2007) have established a program of teacher certification. This certification program aims to improve all aspects of a teacher's competency (Sutopo, 2011). The teacher certification refers to a) pedagogical competency, b) professional competency, and c) personal competency.

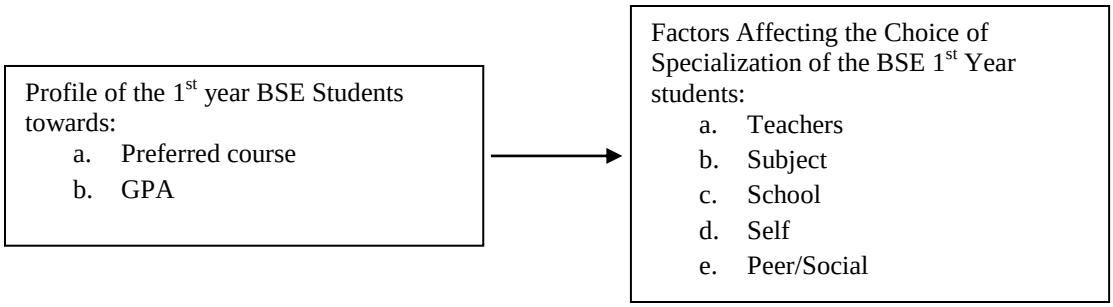

Fig. 1. Research Paradigm

Numerous studies and researches aim to determine factors affecting the performance of the students. Among those studies regarding factor influencing the performance of the students, the most important factor is their attitude towards mathematics. Often, the studies found out that the students' attitude and performance show a positive relationship (Mohd, Mahmood, & Ismail, 2011; Bramlett & Herron, 2009; Nicolaidou & Philippou, 2003). Cocal (2017) found that 10% of the performance of first year college students in Mathematics is attributed on how he conceives mathematics.

Conceptual Framework

The conceptual framework of this study is presented in figure 1. The figure shows the variables used in this study. The first box contains the independent variables, while the second box contains the dependent variables. The purpose of this process is to determine the factors that influence the students to select math as their field of specialization.

This study aimed to determine the factors that affect the interest of the BSE first year students of Pangasinan State University, Bayambang Campus during the school year 2010-2011 to take math as a course. Specifically, the study aimed to determine the profile of the 1st year BSE students towards their preferred course and grade point average, the factors affecting the choice of specialization of the BSE 1st year students, and the relationship between the GPA and factors affecting their choice of specialization.

II. METHODOLOGY

This study used a descriptive, comparative method of research with a questionnaire as data gathering instrument. This method described the level of interest of 1st yr. BSE students' taking mathematics as a course. It also analyzed the differences between the level of the attitude of the students who took math as a field of specialization and those students who did not take math as a field of specialization among the given factors.

The respondents of this study were the 1st year Bachelor of Secondary students of Pangasinan State

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University Bayambang Campus. There were 71 Bachelor of Secondary Education students who were used as respondents in this study enrolled during A.Y. 2014-2015, 20 were Math majors, and the rest (51) were non-Math majors.

The student's profile and attitude towards the specified factors were measured using 3 points Likert-scale questionnaire. The questionnaire is composed of two parts. The first part was used to determine the profile of the respondents and the second part was used to measure their attitude towards the given factors.

The data gathered were analyzed and described through statistics. The respondents' profile was analyzed using descriptive statistics. The students' level attitude towards the given factors was determined using average weighted mean. To determine if there is a significant difference between the perception of the students who preferred math as their specialization and those who non-Math as their specialization towards the given factors z – test was employed. Moreover, to determine the significant relationship between the GPA and their perception towards the given factors, Pearson r Moment Correlation was used.

III. RESULTS AND DISCUSSION

TABLE 1. PERFORMANCE OF THE BSE 1ST YEAR IN ALGEBRA

Course	GPA	f	Mean	Stdv	CV	Skewness			Kurtosis		
						Sk	Se of Sk	Description	Ku	Se of Ku	Description
Non Math	2.75	3	1.95	0.39	20.0%	0.37	0.34	Approximately Normal	-0.81	0.69	Approximately Normal
	2.5	4									
	2.25	14									
	2	14									
	1.75	10									
	1.5	4									
	1.25	2									
	Total	**51**									
Math	2.75	0	1.57	0.19	12.1%	-0.53	0.55	Approximately Normal	-0.93	1.1	Approximately Normal
	2.5	0									
	2.25	1									
	2	1									
	1.75	8									
	1.5	7									
	1.25	3									
	Total	**20**									

The average performance in Algebra of the students' who non-Math and prefer math as specialization were 1.95 and 1.57 respectively. Those students who preferred math as a course perform better in the college algebra subject than the students who non-Math as specialization. The variability of the distribution of those students who prefer math were more homogeneous than the students who non-Math as their specialization. Regarding the asymmetric distribution of the performance of the respondents, the distribution of the performance of the students' who prefer not to take math as a course is positively skewed while the students' who prefer to take math as a course is negatively skewed concerning their corresponding means. Moreover, both distributions were approximately normal regarding asymmetry. Regarding the size of the distribution tails, both distributions are approximately normal.

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TABLE 2. TEACHER-RELATED FACTORS AFFECTING THE INTEREST OF THE 1ST YEAR STUDENT'S TO TAKE MATH AS THEIR SPECIALIZATION

	Math		Non Math	
	Mean	**D**	**Mean**	**D**
1. The math teachers motivate the students to take math as a course.	2.57	A	2.15	U
2. The math teacher's master the subject matter teaches with complete instructional materials and the needed samples/models for satisfactory learning.	2.67	A	2.21	U
3. The math teachers demonstrate sensitivity to students' ability to attend and absorb content information.	2.48	U	1.98	U
4. Explain the relevance of present topics to previous lessons, and relates the subject matter to relevant current issues and/or daily life activities.	2.48	U	2.21	U
5. The teacher is capable of making the subject matter interesting and challenging.	2.57	A	2.16	U
6. The teachers allow students to think independently and make their own decisions and holding them accountable for their performance based large on their success in executing decisions.	2.52	A	2.31	U
7. The teachers encourage students to learn beyond what is required and help/guide the students how to apply the concepts learned.	2.67	A	2.23	U
8. The math teachers create or use a variety of teaching methods/strategies that allow students to practice they need to understand (Interactive Discussion).	2.29	U	2.18	U
9. Math teachers assume roles as facilitator, resource person, inquisitor and integrator in drawing students to contribute to knowledge and understanding of the concepts at hands	2.48	U	2.25	U
10. Mathematics teachers are fair in grading students.	2.62	A	2.32	U
11. Mathematics teachers are kind and approachable.	2.71	A	2.50	U
12. Mathematics teachers are efficient and effective.	2.62	A	2.23	U
Overall Average Weighted Mean	**2.56**	**A**	**2.23**	**U**

Bachelor of Education students at the Pangasinan State University Bayambang Campus chose their specialization after their first year of schooling. The Math majors agreed on the different teacher-related factors affecting their choice of specialization. This was shown by the overall mean value of 2.56. However, the non-Math majors were found undecided whether the given teacher-related factors have affected their choice of specialization as indicated by the overall mean value of 2.23. In general, the 1st year BSE students were undecided whether the identified teacher-related factors have affected their choice of specialization.

Of the different identified teacher-related factors, the Math majors have agreed the most that they took Math as their specialization because "Mathematics teachers are kind and approachable." Teachers would improve the atmosphere of classrooms so that students may be motivated to acquire the essential foundation in that course. If they were motivated everything well follows, their attitude towards the course would improve, and they will enjoy studying math (Natsir and Anisati, 2015).

TABLE 3. SUBJECT-RELATED FACTORS AFFECTING THE INTEREST OF THE 1ST YEAR STUDENT'S TO TAKE MATH AS THEIR SPECIALIZATION

	Math		Non Math	
	Mean	**D**	**Mean**	**D**
1. Mathematics is not difficult subject and does not need a wider and critical ability of thinking.	1.90	U	1.74	U
2. Mathematics includes a vast coverage of knowledge, but easy to understand.	2.00	U	2.00	U
3. Mathematics improves quality of living.	2.81	A	2.28	U
4. Mathematics impresses you upon its wide importance, applicability and relation to another course.	2.76	A	2.20	U
5. Mathematics is worthwhile and necessary subject.	2.90	A	2.33	U
6. Mathematical knowledge is applicable to solving human natural problems.	2.57	A	2.23	U
7. Mathematics has few technical terms that are easy to remember.	2.43	U	2.20	U
8. Mathematics helps me to developed good reasoning ability.	2.67	A	2.13	U
Overall Average Weighted Mean	**2.51**	**A**	**2.12**	**U**

Results showed that the Math majors agreed on the different subject-related factors in choosing Math as their specialization. However, the non-math majors were undecided whether the given indicators have affected their choice of specialization. Overall average weighted mean values of 2.51 and 2.12 were computed respectively, descriptively rated as "agreed" and "undecided."

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Of the different indicators, the Math majors agreed the most that they chose Mathematics as their specialization because "Mathematics is worthwhile and necessary subject" and "Mathematics improves quality of living." Average weighted mean values of 2.90 and 2.81 were computed respectively. The students are aware of the importance of Mathematics in the day-to-day lives.

TABLE 4. SCHOOL-RELATED FACTORS AFFECTING THE INTEREST OF THE 1ST YEAR STUDENT'S TO TAKE MATH AS THEIR SPECIALIZATION

	Math		Non Math	
	Mean	**D**	**Mean**	**D**
1. Many reliable textbooks and references to use for effective learning.	2.19	U	1.95	U
2. The textbooks, reference books and instructional materials we used are presented simple manner that they are easy to comprehend.	2.19	U	1.97	U
3. Plenty of high tech instructional materials (computer aided instructions, mathematics software etc,)	1.71	U	1.77	U
4. Textbooks had many illustrative examples, supplements and presented in a very simple way.	2.19	U	2.12	U
5. Mathematics rooms are spacious, good atmosphere and conducive to learning.	2.33	U	2.28	U
6. Inadequate books for the mathematics courses.	1.86	U	2.03	U
Overall Average Weighted Mean	**2.08**	**U**	**2.02**	**U**

Results revealed that the students, Math majors and non-Math majors, were undecided whether the different school-related factors have affected their choice of specialization. The physical environment and resources of the school are not significant factors that affect the choice of specialization of a student.

TABLE 5. SELF-RELATED FACTORS AFFECTING THE INTEREST OF THE 1ST YEAR STUDENT'S TO TAKE MATH AS THEIR SPECIALIZATION

	Math		Non Math	
	Mean	**D**	**Mean**	**D**
1. Mathematics subject is not boring.	2.62	A	1.92	U
2. Not only brilliant students can understand mathematics.	2.52	A	1.97	U
3. I used mathematics in many ways of life.	2.67	A	2.13	U
4. Mathematics is the best subject I've known.	2.62	A	1.85	U
5. Attending mathematics class is not a waste of time.	2.76	A	2.30	U
6. Mathematics is useful in the society.	2.81	A	2.35	U
7. I like solving mathematics problems.	2.38	U	1.83	U
Overall Average Weighted Mean	**2.63**	**A**	**2.05**	**U**

Results of the study showed that the Math majors had agreed on the different self-related factors why they chose Math as their specialization. However, they were undecided whether they chose Math as their specialization because they like solving mathematics problems.

TABLE 6. PEER/SOCIAL-RELATED FACTORS AFFECTING THE INTEREST OF THE 1ST YEAR STUDENT'S TO TAKE MATH AS THEIR SPECIALIZATION

	Math		Non Math	
	Mean	**D**	**Mean**	**D**
1. Most of my friends take mathematics as their course. So, I decided to take the course.	1.23	D	1.47	D
2. My classmates who will take mathematics share their idea when I ask them about our lesson that I was confused.	2.38	U	2.05	U
3. I take mathematics because; I want to be with my classmates who will take mathematics as a course.	1.24	D	1.37	D
4. I have friends, sister or brother in 2nd year and 3rd year mathematics students, which I can depend if I would like to know something in math.	1.29	D	1.33	D
5. My relatives and my family influence my decision to take math as major	1.49	D	1.38	D
Overall Average Weighted Mean	**1.51**	**U**	**1.52**	**U**

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As reflected in Table 6, the Math majors have disagreed to 4 of the five peer/social-related indicators affecting their choice of math as their specialization. The same was observed among the non-math majors. Peer or social factors do not influence the choice of specialization of the students.

TABLE 7. DIFFERENCES BETWEEN THE RESPONDENT ACCORDING TO THEIR PREFERRED COURSE TOWARD THE GIVEN FACTORS

	Preferred Course	Mean	Mean Difference	t-value	Df	Sig. (2 tailed)
Teachers Factor	Math	2.5667	.34028	3.188**	78	.002
	Non Math	2.2264				
The Subject	Math	2.5438	.41875	4.179**	79	.000
	Non Math	2.1250				
The School Factor	Math	2.0500	.03305	.321	77	.749
	Non Math	2.0169				
Self Factor	Math	2.6500	.60000	6.145**	78	.000
	Non Math	2.0500				
Social Factor	Math	1.5400	.02000	.147	78	.884
	Non Math	1.5200				

The Math and non-math majors significantly differed on their perceptions on the teacher-related, subject-related, and self-related factors affecting their choice of specialization. The Math majors have agreed that the above mentioned factors were considered by them in choosing math as their specialization.

TABLE 8. RELATIONSHIP BETWEEN THE GPA IN ALGEBRA OF THE RESPONDENTS AND THEIR PERCEPTION ON THE DIFFERENT FACTORS AFFECTING THEIR CHOICE OF SPECIALIZATION

	GPA		
	Spearman rho	Sig. (2-tailed)	N
Teacher's Factor	.313(**)	.008	71
Subject Factor	.306(**)	.009	71
School Factor	-.129	.286	70
Self Factor	.471(**)	.000	70
Social Factor	.039	.751	70

Teacher-related, subject-related, and self-related factors were found significantly related to the performance of the students in Algebra as shown by the p-values of 0.008, 0.009 and 0.000 respectively. The null hypothesis is rejected. The above-mentioned factors positively affect the performance of the students in Algebra. These results agree with the findings of Monoranjan & Bharati (2013), the students who perform better tend to have a higher attitude towards mathematics. Moreover, the preceding findings also consonance to those of Mohd, Mahmood, & Ismail, (2011) found out that the students' attitude and performance show a positive relationship towards each other.

IV. CONCLUSION

Teacher-related, subject-related, and self-related factors are important considerations why students chose mathematics as their specialization. Said factors mentioned above also positively affect the performance of the students in Algebra.

V. RECOMMENDATIONS

Based on our findings, to increase the interest of students to take math as their course the math teachers should show mastery to the subject matter by relating to current issues, capable to make subject matter challenging and interesting, use sample models and manipulative, demonstrate sensitivity to the students' ability, fair in grading students, kind and approachable.

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