

Personal Variables and Anxiety in English and Mathematics: Correlational and Comparative Investigation among Pre-University Students

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Abstract

Literatures on the role of students' emotion in learning have brought to light some realizations as to how teaching should transpire. This comparative and correlational research attempts to enrich further such realizations by providing more information about language and mathematics anxieties—two of the most investigated forms of anxiety. This study also correlated some profile variables such as age, sex, ethnic affiliation, and type of high school attended to the two anxieties. Involved in the investigation were 98 pre-university students who were part of the last batch of students in the Pre-University Center in the second semester of academic year 2015-2016. The reliable questionnaires used to gather data were the Abbreviated Mathematics Anxiety Rating Scale (A-MARS) and the Foreign Language Classroom Anxiety Scale. Data revealed that students have significantly higher level of mathematics anxiety compared to their language anxiety level. There was a negative correlation between the said anxieties, but it was not significant. The descriptors of mathematics anxiety showed that fear of assessment and evaluation, like final grading, upcoming tests, and taking an exam, was the main cause their anxiety. However, the language anxiety descriptors only exhibited indirect and inconclusive behavioral causes to their anxiety such as feeling like not going to their English class and thinking of other irrelevant things during the class. When profile variables were correlated with mathematics and language anxieties, only sex was found to be significantly associated with mathematics anxiety while none had a significant relationship with English language anxiety. A significant difference was also found between male and female students' mathematics anxiety levels, showing that female students were more anxious than male ones. Findings

imply that mathematics and language teachers need to improve their teaching methods and styles to alleviate, if not eliminate, students' anxieties.

Keywords: Affective Domain, Mathematics anxiety, English Language Anxiety, Profile variables

1. Introduction

Researchers have investigated many factors affecting the learning process. Among them are students' learning styles, multiple intelligences, and learning preferences. However, these factors are confined within the cognitive capabilities of learners. In the humanistic perspective, learning does not only concern students' intelligence and ability to manage and develop their learning habits. In other words, learning is framed not only in the mental, social and psychomotor domains of students, but also within the realm of emotion.

The connection between emotion and learning has been a persistent issue in education. Oftentimes teachers forget that learners under their tutelage also have special needs, regardless of their skills, abilities, and dispositions. Despite emphasis on the importance of students' emotions in learning, numerous issues still exist, presenting teachers as inconsiderate facilitators of the learning process.

There has been a large body of literature dealing with the role of affective variables in learning. One of the most investigated affective variable is anxiety or the feeling of fear and apprehension when situated in a certain context. Blau (1955), one of the pioneers in anxiety research, described it as an emotion characterized by discomfort and strain when an individual encounters danger and seems helpless. Various researchers proposed three major forms of anxiety. Scovel (1978) conceptualized *trait anxiety*, which he described as the inherent type or permanent nature of individuals. The second type, *state anxiety* by Spielberger (1983), refers to that uneasiness or tension one feels as consequence to a certain situation he or she encounters. The last type, *situation specific anxiety*, is the anxiety felt when in a unique situation or event (Ellis, 1994).

This research aims at describing students' anxiety towards language and mathematics, which the researchers describe as forms of situation specific anxiety. It also attempts to ascertain the potential connection between language and mathematics anxieties through identification of similar factors causing them. Furthermore, students' personal information such as age, sex, and type of school last attended are determined to identify which among these have a potential influence on students' anxieties. Students are then categorized according to their personal information to compare their language and mathematics anxiety levels.

2. Literature Review

2.1. Mathematics Anxiety

Many researchers have expressed a similar idea that mathematics anxiety is a perennial obstacle in mathematics teaching and learning (Vinson, 2001; Uusimaki & Nason, 2004). Defined as "feelings of tension and anxiety that interfere with the manipulation of numbers and the solving of mathematical problems in a wide variety of ordinary life and academic situations" (Richardson & Suinn, 1972, p.551),

mathematics anxiety was detected in the 1950's by Dreger and Aiken (1957) when they observed that their students in college seemed to have a particular emotional reaction to the mathematics course. Since then, this type of anxiety has been considered a block to learning mathematics due to its debilitating effect on comprehension (Gresham, 2009; Vinson, 2001; Hembree, 1990).

Efforts to understand further this phenomenon led Byrd (1982) to offer an extended description of mathematic anxiety. Accordingly, it is a complex construct consisting of “affective, behavioral and cognitive responses to a perceived threat to self-esteem, which occurs as a response to situations involving mathematics” (Atkinson, 1988). While Cemen (1987) maintained it is a “state of discomfort created when students are required to perform mathematical tasks”, Vinson (2001) considered it beyond loathe towards mathematics. On that note, mathematics anxiety indeed presents itself as a profound type of challenge for students who struggle to acquire mathematical skills. This is quite a problem that needs great attention both through effective instruction and through relentless research studies.

Jain and colleagues (2009) have forwarded later definitions of mathematics anxiety as well as Devine and colleagues (2012). The former opined that it is “an inability to handle frustration, excessive school absences, poor self-concept, internalized negative parental and teacher attitudes toward mathematics, and an emphasis on learning mathematics through drill without “real” understanding” (p. 240). The latter further described it in terms of its causal variables, to wit: environmental variables (e.g. experiences in class and at home), intellectual variables (e.g. cognitive ability level), and personality variables (e.g. level of self-confidence).

Many researchers have already found evidences proving the debilitating effects of mathematics anxiety on individuals suffering from it. Having reviewed studies on pre-service teachers' math anxiety, Haciomeroglu (2013) found previous researches agreeing that high math anxiety level causes pre-service teachers to perform poorly in mathematics teaching (Ameen et al., 2002; Bush, 1989; Levine, 1993; Peker, 2009; Peker & Ertekin, 2011). Moreover, Venkatesan (2009) identified math avoidance and performance drop as common consequences of mathematics anxiety. Clute (1984), Hembree (1990), and Ashcraft and Kirk (2001) are among those who provided data about such consequences. Gary (2005) even claimed that anxious students might enjoy only limited career options due to the two aforementioned effects of math anxiety.

Nevertheless, Shemp (1986) and Haciomeroglu (2013) believe that students' performance in mathematics may not always decline when they are anxious because a considerable anxiety level may still be facilitative. As said, too much of something is dangerous. Thus, math anxiety becomes expectedly enervating when it is beyond considerable.

2.2. Language Anxiety

Language, similar to math, may seem foreign, demanding, and challenging to students. If mathematics confronts students with complex numerical problems and formulae, language also perplex students with dynamic structures, rules, and linguistic functions. Described as such, language can potentially make learners anxious, which may result in undesirable consequences that hinder effective language learning.

MacIntyre and Gardner (1994) defined language anxiety as “the feeling of tension and apprehension specifically associated with second language contexts, including speaking, listening, and learning” (p. 284). This definition gives a picture of language learners experiencing undesirable emotions during the learning process. Clearly, the existence of such a feeling creates a barrier that encumbers linguistics skills development. Young’s (1991) definition stating that it is the “worry and negative emotional reaction aroused when learning or using a second language” (p. 27), further supports the gravity of its impact on learners in that language use seems difficult, or worse, impossible to happen with anxiety.

A large number of experts have ascertained the uniqueness of language anxiety as a type of anxiety (Horwitz, Horwitz, & Cope, 1986; MacIntyre & Gardner, 1989, 1991a, 1991b). Horwitz (1986) maintained that it is comprised of three components, to wit: communication apprehension, fear of negative social evaluation, and test anxiety. The first one pertains to the fear of using the target or second language in communicative situations especially speaking. The second component points out students’ fear of receiving negative comments and remarks from others who listen or watch them communicating using the language. The last one is characterized by the feeling of tension when taking examinations that assess or measure students’ ability to use the language.

Being an affective filter, language anxiety is a major cause to many negative circumstances. Decades of research found anxiety as a debilitating factor that influences language production and learning (Cheng, 2002; Dewaele & MacIntyre, 2014). Meaning, learners’ performance suffer significantly because of its existence. Moreover, other researchers focused their attention on the sources of language anxiety. Young (1991) identified contributory factors such as personal factor, beliefs about language, teachers’ beliefs about teaching a foreign language, classroom procedures and testing. Other findings point to level of language course, language skills, motivation, proficiency, teachers, tests, and culture (Bailey, 1983; Ellis and Rathbone, 1987; Young, 1990; Sparks and Ganschow, 1991) as the culprits behind language anxiety. Alico (2015) also added more reasons behind language anxiety such as family expectations and pressure, perceived incompetence, and level of difficulty of lessons.

3. Methodology

This study employed quantitative methods, particularly correlation and comparison. The researchers surveyed the personal profile and anxiety of ninety-eight (98) students enrolled during the second semester of the academic year 2015-2016 in the Pre-University Center, Mindanao State University-Marawi, Philippines. It was the last semester of the Center’s operation as consequence to the implementation of the recent K-12 Curriculum. The Pre-University Center (PUC) was an institution of pre-university learning offered by the MSU-Marawi to accommodate students who failed in the MSU System Admission and Scholarship Examination. Subject areas offered in the program were English, Mathematics, and Values Education. The promotion policy stipulates that if students pass the three areas, they will qualify for admission in college.

The participants’ age ranged from 16 to 26 years old and the majority (67.3%) was composed of female students. Muslim students comprise the largest portion of the sample (74.5%) while in terms of school type, students who graduated from public high schools had the most number (70.4%).

The instrument used to determine students’ language anxiety was the Foreign Language Classroom Anxiety Scale (FLCAS) developed by Horwitz, et al. (1986). This 33-item scale was intended for the identification of learners’ language anxiety, which has different components like communication apprehension, fear of negative evaluation, test anxiety, and classroom anxiety. Subjects respond to the questionnaire by rating the statements using a 5-point Likert scale from *Strongly Agree* to *Strongly Disagree*. Various researchers like Truitt (1995), Horwitz and Garza (1999), Batiha, et al., and Alico (2015) have confirmed that the questionnaire is reliable and valid.

On the other hand, students’ mathematics anxiety was examined using the Abbreviated Mathematics Anxiety Rating Scale (A-MARS) that contains 25 indicators stating different situations or activities that commonly happen in a mathematics class. Same with the FLCAS, the A-MARS is completed by rating the indicators using a 5-point Likert scale ranging from *Not at all* to *Very much*.

4. Results and Discussion

Extracted from the gathered data are the following findings. First, Table 1 presents the data on students’ mathematics anxiety. Data reveal that students are not anxious walking into a math class and less anxious when buying a math textbook. However, they are very much anxious when receiving final math grade, thinking about an upcoming math test an hour before as well as a day before, and taking an exam (final) in math. In other words, students experience mathematics anxiety mostly in situations related to assessment of their performance. These include preparing for math tests, taking those tests, and thinking about the outcome of their tests.

Table 1. Students’ Mathematics Anxiety

Indicators	M	SD
1. Receiving your final math grade in the mail	4.60	.93
2. Thinking about an upcoming math test 1 hour before	4.49	.93
3. Taking an exam (final) in a math course	4.39	.88
4. Thinking about an upcoming math test 1 day before	4.37	.89
5. Listening to another student explain a math formula	4.00	1.17
6. Thinking about an upcoming math test 1 week before	3.98	1.06
7. Opening a math or stat book and seeing a page full of problems	3.96	.95
8. Watching a teacher work on an algebraic equation on the blackboard	3.81	1.18
9. Realizing you have to take a certain number of math classes to fulfill requirements	3.73	.90
10. Being given a “pop” quiz in a math class	3.68	1.04
11. Picking up math textbook to begin a difficult reading assignment	3.63	1.02
12. Taking math section of the college entrance exam	3.57	1.09
13. Getting ready to study for a math test	3.48	1.03
14. Taking an exam (quiz) in a math course	3.46	1.04
15. Being given a set of division problems to solve	3.38	1.23
16. Studying for a math test	3.30	1.08
17. Being given homework assignments of many difficult problems that are due the next class meeting	3.28	1.30
18. Signing up for a math course	3.19	1.48

19. Being given a set of multiplication problems to solve	3.19	1.17
20. Picking up math textbook to begin working on a homework assignment	2.92	1.19
21. Being given a set of subtraction problems to solve	2.88	1.13
22. Being given a set of numerical problems involving addition to solve on paper	2.77	1.22
23. Reading a cash register receipt after your purchase	2.71	1.14
24. Buying a math textbook	2.67	1.37
25. Walking into a math class	1.77	1.22
OVERALL MEAN	3.49	1.10

These findings can be attributed to another type of anxiety called test anxiety. As defined by Ndirangu, Muola, Kithuka and Nassiuma (2009), it refers to “the hyper-arousal condition that results in physiological, emotional and intellectual changes that prevent the effective use of the previously learned information, while taking an examination” (p.2). Based on the findings, the respondents’ fear of math tests seem to resemble the said description.

Furthermore, their fear of the receiving their grade seems related to fear of negative evaluation. Because students consider math a cognitively demanding subject, they tend to be less confident and uncertain of their performance during tests. Due to this uncertainty, they tend to feel much anxious when they are finally handed with their grade.

Overall, the students disclosed being much anxious to mathematics, which is quite an alarming level. This clearly calls for math teachers to act upon the issue. It may remain a vicious problem that affects students in every math course they take.

Table 2. Students’ English Language Anxiety

Indicators	M	SD
1. I often feel like not going to my English class.	3.83	1.01
2. In English classes, I think of things that are unrelated to the lesson.	3.56	.99
3. Before English class, I don’t feel confident and relaxed.	3.31	.79
4. I am usually not at ease during tests in my class.	3.28	.81
5. I do understand why some people get so upset over English class.	3.28	.82
6. I feel tenser and have more pressure in English class than in other classes.	3.26	.99
7. I think that my classmates’ English is better than I am.	3.17	1.01
8. It embarrasses me to volunteer answers in my English class.	2.88	.88
9. I am afraid that my English teacher will correct every mistake I make.	2.87	.97
10. I don’t feel pressure to prepare very well for English class.	2.87	.77
11. I tremble when I know that I’m going to be asked to speak in English class.	2.86	.82
12. I feel uneasy when native English speakers are with me.	2.83	.90
13. I will be nervous when speaking with native English speakers.	2.77	1.01
14. I get depressed when I don’t understand what the teacher is correcting.	2.76	.92
15. I feel unconfident when I speak in English class.	2.74	.73
16. I always feel that my classmates speak better English than I.	2.73	.79
17. The more I prepare for an English test, the more confused I get.	2.71	.99
18. I feel my heart pounding when I am going to be asked to speak in English class.	2.70	.89
19. I get nervous when I speak in my English class.	2.65	.81

20. I am afraid that my classmates will laugh at me when I speak English.	2.64	.94
21. I feel overwhelmed by the number of rules I have to learn to speak English.	2.63	.71
22. I am afraid when I don't understand what the teacher is saying in the English class.	2.61	1.07
23. English class moves so quickly that I worry about getting left behind.	2.60	.94
24. I never feel quite sure of myself when I am speaking in my English class.	2.60	.68
25. It would bother me at all to take more English classes.	2.55	.97
26. I get nervous when I don't understand every word the English teacher says.	2.50	.86
27. I worry about making mistakes in English class.	2.43	.83
28. In English class, I am so nervous that I forget what I know.	2.36	.97
29. Even if I am well-prepared for English class, I feel anxious about it.	2.34	.77
30. I feel shy when speaking English in front of other students.	2.34	.91
31. I start to panic when I have to speak without preparation in English class.	2.32	.81
32. I get nervous when the English teacher asks questions which I haven't prepared in advance.	2.11	.77
33. I worry about the consequences of failing my English class.	1.80	1.06
OVERALL MEAN	2.81	.88

Furthermore, Table 2 presents the level of students' English language anxiety. Data reveal that they often feel like not going to their English class and that they think of things that are unrelated to the lesson. They also disclosed being uncomfortable and uneasy when they are in the English class. This result does not conform to Allico's (2015) findings that students are anxious due to their fear of failing their English class. These results indicate that anxiety towards English language exists among students; however, it is not as high as their math anxiety. Looking at their respective means, there is a disparity between math anxiety and English language anxiety. While students' English language anxiety descriptors only exhibited indirect behavioral causes to their anxiety such as *feeling like not going to their English class* and *thinking of other irrelevant things during the class*, their math anxiety is largely caused by assessment-related circumstances that are apparently important when speaking of learning.

Table 3. Correlation Analysis between Math Anxiety and English Language Anxiety

Variables	Pearson r	Sig. (2-tailed)	Description
English and Mathematics Anxieties	-0.042	0.684	Not significant

Interestingly, correlation analysis result in Table 3 reveals that there is no sufficient evidence to show that a significant relationship between math anxiety and English language anxiety exists ($p > 0.05$). This signifies that despite their similarity as types of anxiety, they do not necessarily play a predictive role in each other. This finding seems to negate Ashcraft (2002) in his claim that students with high math anxiety tend to score high in tests of other types of anxiety. However, the study may support May (2009) in her assertion that students with mathematics anxiety do not necessarily possess anxiety in other subjects (May, 2009).

Table 4. Correlation Analysis between Personal Profile and Anxiety

Anxieties	Age	Sex	School Type
Mathematics Anxiety	0.617	0.000*	0.167
English Language Anxiety	0.350	0.854	0.461

In the table above, it can be gleaned that among the three personal profile variables, only sex has a significant relationship with mathematics anxiety ($p < 0.05$). Furthermore, none among the variables were significantly associated with English language anxiety ($p > 0.05$). The said finding signifies that sex is an important factor in math anxiety. The significant relationship between math anxiety and sex led the researchers to compare the levels of math anxiety between male and female students. The table below shows the results of the comparison.

Table 5a. Group Statistics for Sex

Anxieties	Sex	N	Mean	Std. Deviation	Std. Error Mean
Math Anxiety	Male	32	3.1967	.59342	.10490
	Female	66	3.6347	.46960	.05780
English Language Anxiety	Male	32	2.8066	.24827	.04389
	Female	66	2.8168	.26070	.03209

Table 5b. Independent Samples Test for Male and Female Students' Mathematics and English

		Levene's Test		t-Test			Mean Difference
		F	Sig.	t	df	Sig.	
Math Anxiety	Equal variances assumed	2.610	.109	-3.965	96	.000	-.43809
	Equal variances not assumed			-3.658	50.463	.001	-.43809
English Language Anxiety	Equal variances assumed	.072	.788	-.185	96	.854	-.01024
	Equal variances not assumed			-.188	64.249	.851	-.01024

The tables above show that male and female respondents have comparable levels of English language anxiety ($p > 0.05$), meaning that there is no significant difference between them. This finding supports Aida (1994) and Onwuegbuzie, et al. (1999) in their statement that sex has nothing to do with English language anxiety. However, other researchers claim the opposite in reporting that significant anxiety-gender effects exist (Matsuda & Gobel, 2004; Kitano, 2001).

Contrary to the previous finding, data reveal that a significant difference exists between male and female respondents' math anxiety levels ($p < 0.05$). Specifically, female respondents have a higher math anxiety level ($M=3.63$) than male ones ($M=3.19$). On this issue, studies have been in disagreement. In an earlier

study, Ma (1999) concluded after a meta-analysis that there is no significant difference between male and female students' math anxiety. On the other hand, many claim otherwise, particularly describing female students as more anxious than male students are (Pourmoslemi, Erfani & Firoozfar, 2013; Baloglu & Koçak, 2006). The present study's finding seems consistent with the latter.

Table 6a. Group Statistics for School Type Last Attended

	School Type	N	Mean	Std. Deviation	Std. Error Mean
Math Anxiety	Private School	23	3.3852	.58955	.12293
	Public School	69	3.5612	.50142	.06036
English Language Anxiety	Private School	23	2.8368	.20482	.04271
	Public School	69	2.7919	.26471	.03187

Table 6b. Independent Samples Test

		Levene's Test		t-Test			
		F	Sig.	t	df	Sig.	Mean Difference
Math Anxiety	Equal variances assumed	1.500	.224	-1.394	90	.167	-.17599
	Equal variances not assumed			-1.285	33.26	.208	-.17599
English Anxiety	Equal variances assumed	1.401	.240	.741	90	.461	.04484
	Equal variances not assumed			.841	48.45	.404	.04484

Last set of results is shown in Table 6a and 6b above. The researchers included in the comparative analysis the students' type of high school education with the goal of establishing a link between school type and anxiety.

In both types of anxiety, data present a difference between the means of students who graduated from private and public schools. In math anxiety, students from public schools (M=3.56) are more anxious than those from private schools (M=3.38), whereas in English language anxiety, those who came from private schools (M=2.83) are more anxious than their counterpart is (M=2.79).

Despite the mean differences, the t-Test results reveal that there is no sufficient evidence to conclude that school type matters in both math and English language anxiety. Whether students underwent private or public education, it does not mean that their math and English language anxiety levels have differences.

5. Conclusion

The main goal of the study is to describe and determine the pre-university students' level of mathematics and English language anxiety. Based upon the findings of the study, students tend to be more anxious in

mathematics than they are in English. While students are very much afraid of mathematics tests and knowing their grades, they do not feel the same way when they are in English class.

In addition, the two anxieties are not associated with each other. Thus, one could not generally contend the common belief that if a student is anxious in mathematics, then he/she is not anxious in English or vice versa. This could be attributed to the theory of multiple intelligences, which asserts that students have their own distinct capabilities and dispositions. Some may be logical-mathematical while others may manifest verbal-linguistic inclination.

Furthermore, despite the insistence of equal treatment between male and female students, sex still seems to factor in when it comes to affective variables like anxiety particularly in mathematics. Mathematics teachers may not necessarily inform female students about their tendency to be more anxious; however, the method of instruction should be as inclusive as possible, especially when there are students who struggle with the subject.

Overall, the researchers conclude that more efforts are needed. English and mathematics teachers, for one, should be aware that anxiety still persists among their students and that they must act upon it in order that it does not get in the way of learning. Interested researchers, secondly, should conduct more studies delving deeper into the nature, causes, and effects of mathematics and English language anxiety for further understanding of these phenomena.

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