



PERCEIVED PROFESSIONAL DEVELOPMENT NEEDS AND EMOTIONAL INTELLIGENCE AS PREDICTORS OF MATHEMATICS TEACHING ANXIETY AMONG MATHEMATICS PRE-SERVICE TEACHERS

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ABSTRACT

The primary purpose of this study was to determine whether perceived professional development needs and emotional intelligence predicts mathematics teaching anxiety among mathematics pre-service teacher. This study employed descriptive and correlational designs. Using the stratified random sampling, 103 mathematics pre-service teachers were selected as participants from Davao del Norte's seven higher education institutions during the school year 2021–2022. Moreover, this study utilized three adapted and validated survey questionnaires to gather data, which were treated using mean, Pearson-r, and regression analysis. The findings suggested that pre-service teachers' perceived professional development needs are highly addressed, and emotional intelligence is manifested most of the time. Furthermore, the mathematics teaching anxiety of mathematics pre-service teachers is less evident. Findings also revealed that both perceived professional development needs and emotional intelligence exhibit a significant negative correlation with mathematics teaching anxiety. In addition, only perceived professional development needs to predict mathematics teaching anxiety among mathematics pre-service teachers. Future researchers may consider the study's findings which may help them uncover other factors that might improve the conduct of perceived professional development needs and emotional intelligence in relation to mathematics teaching anxiety among mathematics pre-service teachers. With these, teachers and school administrators are encouraged to address professional development needs and assess and boost emotional intelligence to help eliminate mathematics teaching anxiety among mathematics pre-service teachers.

KEYWORDS: mathematics education, perceived professional development needs, emotional intelligence, mathematics teaching anxiety, pre-service teachers, descriptive and correlational designs, regression analysis, Philippines

INTRODUCTION

Pre-service teachers frequently experience anxiety when teaching mathematics due to the actual or perceived knowledge gaps in mathematical subjects, mathematics teaching skills, and recollections of prior math failures and anxiety. Many teachers with mathematics teaching anxiety were found to induce anxiety in their students when it comes to learning and completing mathematical tasks. The way abstract ideas are taught or presented to students is significantly influenced by anxiety in mathematics teaching (Alkan, 2019). Moreover, anxious mathematics educators often experience uneasiness and struggle to concentrate in class. Math anxiety can make it difficult to develop mathematical abilities that are necessary in today's world, such as effectively teaching mathematics (Peker & Ulu, 2018).

In UAE, the number of qualified mathematics educators is in short supply, and mathematics teaching anxiety is high among pre-service teachers, which has been a rising concern. This issue causes pre-service teachers to portray negative attitudes toward

mathematics, making it difficult for students to grasp any topic they teach (McMinn & Aldridge, 2020). In addition, Oslon and Stoehr (2019) found that 21 percent of their respondents have experienced poor performance in teaching mathematics due to a high level of mathematics teaching anxiety indicated by their low level of self-confidence and inability to teach mathematical concepts during their field-based practicum in Turkey appropriately. Furthermore, Tinh et al. (2021) found that while Vietnamese pre-service teachers were effectively taught in terms of mathematical content knowledge, they lacked in terms of mathematical teaching pedagogies and how to deal with mathematics teaching anxiety.

In the Philippines, a study conducted by Gillo (2021) in Tacloban City revealed that 35 percent of the respondents got a high level of mathematics teaching anxiety due to their below satisfactory teaching performance during their pre-service teaching period. Further, it was disclosed that students might develop negative thoughts about mathematics due to the teacher's anxiousness, preventing them from increasing their performance or gaining efficiency from the course (Subia et al., 2018). Moreover, in Mati



City, teachers' anxiousness and mathematics teaching anxiety have a negative impact on the learners. The findings indicated that when students ask questions about the strategy or when students formulate a solution that they did not teach, these teachers feel distressed (Alico et al., 2017).

Furthermore, pre-service teachers in Tagum City were found to have a high level of mathematics teaching anxiety. The study by Candido (2019) explained that mathematics teaching anxiety is influenced by characteristics such as mathematics anxiety and self-efficacy. More importantly, the survey disclosed that most pre-service teachers evaluated themselves as having mathematics teaching anxiety in terms of procedural knowledge, conceptual knowledge, attitude toward mathematics, and self-confidence. Candido (2019) further highlighted that pre-service teachers experience mathematics teaching anxiety because they don't know how to stimulate students' interest and encourage them to acquire procedural knowledge in learning mathematics. The same author added that these pre-service teachers with mathematics teaching anxiety have difficulty figuring out math equations on the board in front of a group of students and fail to acknowledge students who want to solve a math problem in a method other than the one presented in class.

Anxiety among pre-service teachers about teaching mathematics may impede their student's academic success or foster indifference toward mathematics. The concern of adopting mathematical instructional approaches that are critical for student comprehension makes pre-service teachers more hesitant to use them. In addition, research suggests that unfavorable perceptions about mathematics and a refusal to recognize their professional development requirements are the influential factors of pre-service teachers' mathematics teaching anxiety (Setiana & Nuryadi, 2020).

The researcher has conducted a literature review similar on this topic to the works of Ertekin (2019), who used phenomenology to describe how secondary pre-service teachers struggle to instruct their students due to mathematics teaching anxiety, and Peker and Ulu (2018), who investigated the association between pre-service teacher's perceptions about mathematics teaching anxiety and their attitude towards teaching and learning mathematics. However, the researcher did not encounter similar studies which talked about perceived professional development needs, emotional intelligence, and mathematics teaching anxiety in one study, especially in the national and local setting. This urges the researcher to research whether perceived professional development needs and emotional intelligence predict mathematics teaching anxiety among pre-service secondary school teachers of higher education institutions in Davao del Norte.

Statement of the Problem

The main objective of this study was to determine whether perceived professional development needs and emotional intelligence significantly predict mathematics teaching anxiety

among mathematics pre-service teachers. Furthermore, this study sought to answer the following objectives:

1. What is the level of perceived professional development needs among mathematics pre-service teachers in terms of:
 - 1.1. conceptual understanding;
 - 1.2. procedural fluency;
 - 1.3. strategic competence;
 - 1.4. adaptive reasoning; and
 - 1.5. productive disposition?
2. What is the extent of emotional intelligence among mathematics pre-service teachers in terms of:
 - 2.1. self-awareness;
 - 2.2. self-management;
 - 2.3. social awareness; and
 - 2.4. relationship management?
3. What is the level of mathematics teaching anxiety among mathematics pre-service teachers in terms of:
 - 3.1. content knowledge;
 - 3.2. pedagogical knowledge;
 - 3.3. attitude towards mathematics; and
 - 3.4. self-confidence?
4. Is there a significant relationship between:
 - 4.1. perceived professional development needs and mathematics teaching anxiety among mathematics pre-service teachers; and
 - 4.2. emotional intelligence and mathematics teaching anxiety among mathematics pre-service teachers?
5. Do perceived professional development needs and emotional intelligence significantly predict mathematics teaching anxiety among mathematics pre-service teachers?

Hypotheses

The following hypotheses were tested at a 0.05 level of significance, stating that:

1. There is no significant relationship between perceived professional development needs and mathematics teaching anxiety among mathematics pre-service teachers.
2. There is no significant relationship between emotional intelligence and mathematics teaching anxiety among mathematics pre-service teachers.
3. Perceived professional development needs and emotional intelligence do not significantly predict mathematics teaching anxiety among mathematics pre-service teachers.

Theoretical and Conceptual Framework

This study was based on Barham's (2020) findings, which revealed that pre-service mathematics teachers' perceived professional development needs exert influence on anxiety in teaching mathematics in the classroom. Similarly, Stoehr (2017) highlighted the necessity of providing professional development programs for mathematics pre-service teachers to avoid



mathematics teaching anxiety. Ruef et al. (2019) further emphasized that providing opportunities for math-anxious pre-service teachers to develop their professional needs makes them feel better, more enthusiastic, and less stressed about teaching mathematics, which leads to more effective teaching approaches that improve student's understanding of mathematics.

Furthermore, this research was based on the findings of Justicia-Galiano (2016), who found that emotional intelligence influences one's anxiety when carrying out mathematical education. In addition, Shirvani (2019) states that emotional intelligence significantly predicts mathematics teaching anxiety among pre-service teachers. Moreover, Hidi et al. (2004) supported that emotionally intelligent teachers are more likely to be encouraged to possess a positive attitude towards mathematics which will thus reduce mathematics teaching anxiety.

Barham (2020) enumerated conceptual understanding, procedural fluency, strategic competence, adaptive reasoning, and productive disposition as the domains of perceived professional development needs. Sterrett (2000) stated that self-awareness, self-management, social awareness, and relationship management were the domains of emotional intelligence. Meanwhile, Alkan et al. (2019) mentioned that content

knowledge, pedagogical knowledge, attitude towards mathematics, and self-confidence were the indicators of mathematics teaching anxiety.

The conceptualized model shown in figure 1 was developed as a result of the propositions and findings of the previously mentioned studies. The independent variables of this study are perceived professional development needs and emotional intelligence, while the dependent variable is mathematics teaching anxiety. Conceptual understanding, procedural knowledge, strategic competence, adaptive reasoning, and productive disposition are the indicators of perceived professional development needs. Meanwhile, self-awareness, self-management, social awareness, and relationship management are the indicators of emotional intelligence. And for the dependent variable mathematics teaching anxiety, the indicators are content knowledge, pedagogical knowledge, attitude towards mathematics, and self-confidence. This paradigm describes how perceived professional development needs might significantly influence mathematics teaching anxiety among pre-service teachers in mathematics; and how domains of emotional intelligence might significantly influence mathematics teaching anxiety among pre-service teachers in mathematics.

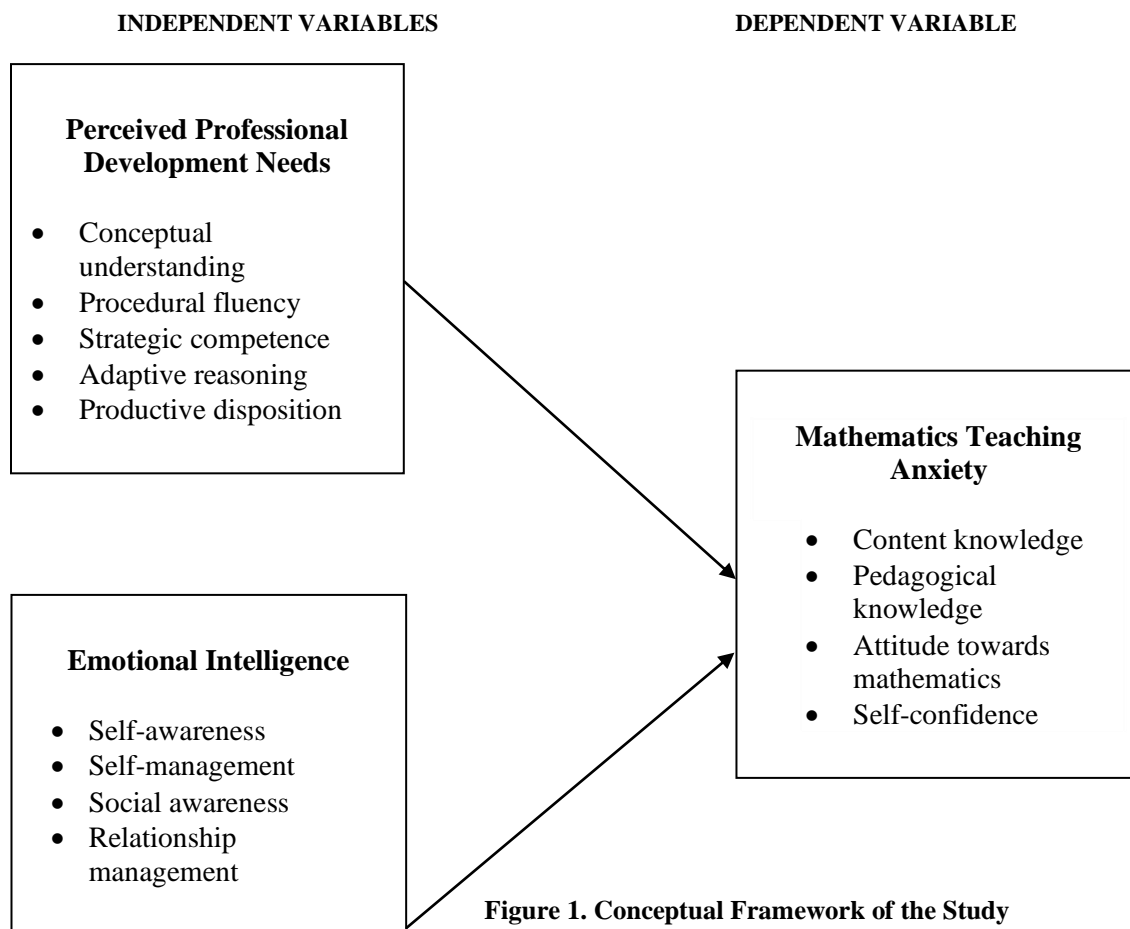


Figure 1. Conceptual Framework of the Study



REVIEW OF RELATED LITERATURE

Mathematics Teaching Anxiety

Many pre-service teachers are anxious about teaching mathematics. Real or perceived uncertainties in mathematical subjects, teaching skills, and recollection of previous math failures or fear could all be factors. Anxiety related to instructional practices, such as planning and conducting classroom activities, is described as teaching anxiety. Professors at postsecondary institutions seem to be concerned about anxiety in the classroom in large numbers (Thomas & Sari, 2019). Additionally, a unique issue is the dread of teaching mathematics. Pre-service teachers with mathematics teaching anxiety experience difficulties figuring out math equations on the board in front of the students and fail to acknowledge students who wanted to solve math problems using methods other than the one presented in the class (Syuhada & Retnawati, 2020).

Mathematical teaching anxiety refers to a pre-service teacher's nervousness and concerns about teaching math concepts, theories, formulas, and problem-solving. Severe anxiety, poor concentration, self-criticism, getting easily distracted by interruptions, inability to hear the students clearly, and sweaty palms are just a few of the symptoms of mathematics teaching anxiety (Sanders et al., 2019).

Perceived Professional Development Needs

The term need can be interpreted as a gap, an acknowledged issue, and a demand for extra service. In today's fast-paced world, mathematics pre-service teachers must participate in professional development to promote a good learning environment and prepare learners for their future careers. With this, pre-service teachers should stay abreast of the latest knowledge and competencies in order to be effective educators in the future (Haemer et al., 2017). In addition, professional advancement is in demand for every profession to qualify in all aspects of a global industry. Professional development in the teaching profession serves the needs of educators by extending subject knowledge, developing curricula, and promoting guiding principles in instructional and managerial practices, which leads to the student's success (Karlberg & Bezzina, 2020).

Mathematics teachers must strive to improve professionally to establish an effective educational experience to help equip students with the necessary knowledge to adapt and succeed in today's rapidly changing world. An efficient educator must not only acquire the skills needed for effective teaching but also be willing to be on par with the evolving knowledge and abilities required of a globally-competent teacher. As a result, attending seminars and development programs to keep math teachers' knowledge and skills up to date is essential (Herro & Quigley, 2017). Moreover, in order to influence reform and improve the quality of education and learning, an administrator will make a purposeful endeavor to engage in the professional development of educators. A comprehensive teacher evaluation system that provided feedback and was tied to professional development was

required to improve effective educational practices (Parrish et al., 2020).

Emotional Intelligence

Emotional intelligence is founded on the idea that emotions and cognitions are intertwined. Teachers' emotions may have a greater influence on how they think, solve problems, and build self-efficacy beliefs than their student's behavior. To put it in another way, emotional intelligence has the potential to influence teaching beliefs and, as a result, effective teaching and student learning (Turner & Stough, 2020). Moreover, teachers must be able to identify and respond to their students' emotions. Expression of feelings, empathy, independence, orienting, problem-solving, benignity, tolerance and respect are all core emotional attributes that can only be attained with great emotional intelligence (Garcia-Martinez et al., 2021).

To offset the negative impacts of stress on students' health, various stress-modulating factors were identified as "buffers." Academic tutoring could be one of these buffers, which, when coupled with rising EI levels, can help people regulate their emotions and manage stress effectively (Shirvani, 2019). Moreover, numerous studies have shown the value of academic mentoring in supporting and nurturing efficient professional and personal growth in the first option. According to Altunkaya (2021), Emotional Intelligence (EI) has emerged as a desirable talent to cultivate and a valuable indicator of physical and psychosocial well-being. It is described as a person's ability to recognize, explain, understand, and govern their own and others' emotions. Although this may be, Emotional Intelligence is difficult to assess.

METHODOLOGY

Research Design

This study is quantitative research that employed a descriptive and correlational design. A quantitative research design is a process of gathering and evaluating quantifiable data. It is commonly used in statistical analysis like cause-and-effect relationships, averages, patterns, and predictions between the variables (Bhandari, 2020). On the other hand, a descriptive approach is a research method that describes the features of the population under investigation (McCombes, 2020). Furthermore, the correlational technique involves gathering information to establish the extent to which the two or more quantitative factors are related (Gay et al., 2011). The researcher used this design to test and determine the relationship of the variables of this study.

Research Participants

The research respondents of this study were the mathematics pre-service teachers coming from the seven different higher education institutions offering BSED Mathematics courses in Davao del Norte. Stratified random sampling was used in the selection of the respondents. The researcher determined the number of respondents using the Online Raosoft Sample size calculator with a confidence level of 95% and a margin of error of 5%. The entire population of the participating higher education institutions is



139. Along with this, a sample size of 103 respondents was obtained based on the computation of the Online Raosoft Sample size calculator. There are 3 students in School A, 21 in School B, 25 in School C, 3 in School D, 7 in School E, 18 in School F, and 26 in School G.

Statistical Tools

The data from each instrument utilized in this study were tallied and recorded appropriately. It was evaluated and interpreted using mean, Pearson-r and multiple regression analysis as statistical tools in light of the study's purpose. Mean was used to determine the level of perceived professional development needs, the extent of emotional intelligence, and level of mathematics teaching anxiety among pre-service teachers in Mathematics. Meanwhile, Pearson-r was used to determine the significance of the relationship between perceived professional development needs, emotional intelligence, and mathematics teaching anxiety among pre-service teachers in Mathematics. In addition, Multiple Regression Analysis was used to determine if perceived professional development and emotional intelligence significantly influence mathematics teaching anxiety among pre-service teachers in mathematics.

Table 1. Level of Perceived Professional Development Needs

Indicators	Mean	SD	Description
Conceptual Knowledge	4.15	0.48	High
Procedural Fluency	4.08	0.54	High
Strategic Competence	4.19	0.55	High
Adaptive Reasoning	4.05	0.54	High
Productive Disposition	4.10	0.63	High
Category Mean	4.12	0.49	High

The results indicated that mathematics pre-service teachers can identify mathematical concepts, teach problem-solving techniques, and build a positive attitude toward mathematics which refers to the need to help equip students with the necessary knowledge to learn mathematics. These results are in consonance with the claim of Haemer et al. (2017), which stated that mathematics pre-service teachers must take part in professional development in order to promote a good learning environment and prepare learners for their future careers. With this, pre-service teachers should stay abreast of the latest knowledge and competencies in order to be effective educators in the future. In addition, Karlberg and Bezzina (2020) stated that professional development in the teaching profession serves the needs of educators by extending subject knowledge, developing curricula, and promoting guiding principles in instructional and managerial practices, which leads to the student's success.

RESULTS AND DISCUSSIONS

Level of Perceived Professional Development Needs

Table 1 presents the level of perceived professional development needs of mathematics pre-service teachers. Among the indicators, strategic competence got the highest mean of 4.19 and is followed by conceptual understanding with a mean of 4.15. On the other hand, adaptive reasoning got the lowest mean of 4.05. The abovementioned indicators have a descriptive equivalent of high which means that they are highly addressed.

Additionally, it has an overall mean of 4.12 with a descriptive equivalent of high, which means that the level of perceived professional development needs of mathematics pre-service teachers is highly addressed. The dispersion of perceived professional development needs based on the responses of the mathematics pre-service teachers revealed that the SD is 0.49. This indicates that most of the respondents have similar responses. This also implies that their perceived professional development needs are more likely close to the mean.

Extent of Emotional Intelligence

Table 2 shows the extent of emotional intelligence of mathematics pre-service teachers. Among the indicators, self-awareness got the highest mean of 4.24 with a descriptive equivalent of very highly extensive, which means it is manifested at all times. This is followed by self-management, obtaining a mean of 4.17 with a descriptive equivalent of highly extensive, which means that it is manifested most of the time. On the other hand, social awareness got the lowest mean of 4.15 with a descriptive equivalent of highly extensive, which also means that it is manifested most of the time.

Additionally, it has an overall mean of 4.18 with a descriptive equivalent of high, which means that the extent of emotional intelligence of mathematics pre-service teachers is highly addressed. The dispersion of emotional intelligence based on the responses of the mathematics pre-service teachers revealed that the SD is 0.47. This indicates that most of the respondents have similar responses. Moreover, this implies that their emotional intelligence is more likely close to the mean.



Table 2. Extent of Emotional Intelligence

Indicators	Mean	SD	Description
Self-awareness	4.24	0.54	Very Highly Extensive
Self-management	4.17	0.56	Highly Extensive
Social Awareness	4.15	0.53	Highly Extensive
Relationship Management	4.16	0.55	Highly Extensive
Category Mean	4.18	0.47	Highly Extensive

The results revealed that mathematics pre-service teachers are aware of their physical reactions, show empathy to others, and deal calmly, sensitively, and proactively with the emotional displays of others. These results support the claim of Turner and Stough (2020), who stated that in comparison to students' conduct, teachers' emotions might have a stronger impact on how they reason, solve issues and develop self-efficacy beliefs. To put it another way, emotional intelligence may have an impact on teaching philosophies, which will then have an impact on successful instruction and student learning. Moreover, Garcia-Martinez et al. (2021) also highlighted that educators must be able to recognize and address students' emotions. Wu et al. (2019) further emphasized that the capacity to understand other people's emotions, motivate oneself, and effectively manage our and other people's emotions is known as emotional intelligence. Exploring this concept's educational implications is especially important since, as was just said, teaching and learning processes and the word "teacher," are all connected to emotional and cognitive abilities.

Level of Mathematics Teaching Anxiety

Presented in table 3 the level of mathematics teaching anxiety of mathematics pre-service teachers. Among the indicators, content knowledge got the highest mean of 2.64 with a descriptive equivalent of moderate, which means their mathematics teaching anxiety in terms of content knowledge is moderately evident. This is followed by self-confidence, obtaining a mean of 2.18 with a descriptive equivalent of low, which means that their mathematics teaching anxiety in terms of self-confidence is less evident. On the other hand, attitude towards math got the lowest mean of 1.91 with a descriptive equivalent of low, which also means that their mathematics teaching anxiety in terms of attitude towards math is less evident.

Furthermore, it has an overall mean of 2.38 with a descriptive equivalent of low, which means that the level of mathematics teaching anxiety of mathematics pre-service teachers is less evident. Moreover, it has an SD of 0.62. The dispersion of mathematics teaching anxiety based on the responses of the mathematics pre-service teachers revealed that the SD is 0.62. This indicates that most of the respondents have similar responses. In addition, this implies that their mathematics teaching anxiety is more likely close to the mean.

Table 3. Level of Mathematics Teaching Anxiety

Indicators	Mean	SD	Description
Content Knowledge	2.64	1.10	Moderate
Pedagogical Knowledge	2.06	0.77	Low
Attitude Towards Math	1.91	0.84	Low
Self-confidence	2.18	0.76	Low
Category Mean	2.38	0.62	Low

The results showed that mathematics pre-service teachers' mathematics teaching anxiety is less evident in using their knowledge and skills related to special teaching strategies when teaching mathematics. They also enjoy teaching mathematics and feel capable of solving math problems in teaching, which conforms to the result that their anxiety in teaching mathematics is less evident. These results were supported by Karunakaran (2020) that pre-service teachers with high confidence in their ability to teach mathematics can effectively teach it. It is also emphasized by their idea that mathematical self-confidence is strong among pre-service teachers who are extremely collected in their abilities to teach mathematics.

Moreover, Peker (2016) highlighted that strong self-confidence in math education also makes teachers more open to new ideas, less

stressed in their students' ability to learn, and more aware of students who are not as good at math. However, the results of this study contrast with the proposition of Syuhada and Retnawati (2020), who stated that mathematics teaching anxiety makes it hard for pre-service teachers to figure out how to write math equations on the board in front of the students. Since the level of Mathematics Teaching Anxiety of the respondents of this study is low, therefore they were not bothered by the overwhelming feeling when they taught the subject matter to their students.

Relationship Between Perceived Professional Development Needs and Emotional Intelligence towards Mathematics Teaching Anxiety

Presented in table 4 is the relationship between perceived professional development needs and emotional intelligence



towards mathematics teaching anxiety. The study results revealed that the independent variables significantly negatively correlate with the dependent variable. It shows that there is a significant negative correlation between perceived professional development needs and mathematics teaching anxiety ($p < 0.05$). The r-value of -0.417 implies a negative correlation between the

abovementioned variables. This means that when the perceived professional development needs among mathematics pre-service teachers are high, their anxiety about teaching mathematics is low. Conversely, when their perceived professional development needs are low, their mathematics teaching anxiety is high.

Table 4. Relationship Between Perceived Professional Development Needs and Emotional Intelligence towards Mathematics Teaching Anxiety

Independent Variables	Mathematics Teaching Anxiety		
	r-value	p-value	Remarks
Perceived Professional Development Needs	-0.417	0.000	Significant
Emotional Intelligence	-0.393	0.000	Significant

This result conformed to the findings of Flynn (2020), who points out that the difficulty posed by the reluctance to seek professional development in mathematics is that instructors who have a negative image of the subject tend to be more anxious about teaching it than those who seek professional development in mathematics. It implies that the higher the mathematics teaching anxiety, the lower the chances a mathematics teacher may seek professional development. Moreover, Lo (2021) highlighted that the pre-service teacher's teaching proficiency in the subject matter negatively correlates to the anxiety in teaching mathematics courses. It is implied that having low levels of mathematics teaching anxiety will greatly boost the perceived professional development needs while they are training themselves with the help of their school to become holistic teachers in the future. Furthermore, Marban et al. (2021) also emphasized that if the instructor's professional development needs are lacking, then the mathematics teaching anxiety would be high or evident. As a contrapositive, if the aforementioned terminologies were more than enough, the mathematics teaching anxiety among pre-service teachers would be low.

Likewise, the table showed that there is a significant negative relationship between emotional intelligence and mathematics teaching anxiety among the mathematics pre-service teachers ($p < 0.05$). The r-value of -0.393 implies a negative correlation between the abovementioned variables. This means that when the emotional intelligence among mathematics pre-service teachers is high, their anxiety about teaching mathematics is low. Conversely, when their emotional intelligence is low, their mathematics teaching anxiety is high.

This result is aligned with the proposition of Sobrevega and Arellano (2014) that there is a negative correlation between emotional intelligence and mathematics teaching anxiety among pre-service teachers. They stipulated that if the students have

developed their emotional and social skills, they are more likely to have lower levels of anxiety in teaching mathematics. In addition, Olango (2016) also asserted that there is a weak negative correlation between mathematics teaching anxiety and mathematics self-awareness, implying emotional intelligence among respondents. It denotes that the greater the stress in the mathematics lesson and the relationships between students and instructors, the lower the self-awareness of the pre-service teacher. In other words, it can also be denoted that the more emotionally intelligent a pre-service teacher is, the less anxious they are about teaching the mathematics course.

Influence of Perceived Professional Development Needs and Emotional Intelligence towards Mathematics Teaching Anxiety

Presented in table 5 the influence of perceived professional development needs and emotional intelligence on mathematics teaching anxiety. The results showed that only Perceived Professional Development Needs appears to be a statistically significant predictor of Mathematics Teaching Anxiety ($p < 0.05$) with a p-value 0.042. The beta value ($\beta = -0.356$) indicates that for every unit increase of perceived professional development needs, mathematics teaching anxiety will decrease by -0.356 units. Emotional Intelligence does not appear to be a statistically significant predictor of Mathematics Teaching Anxiety ($p > 0.05$) with a p-value of 0.183.

The R square of 0.189 shows that the model predicts 18.9% of the statistical variation observed in the mathematics teaching anxiety among mathematics pre-service teachers. The coefficient of alienation which is 81.1%, points to the extent to which other variables may explain the variance observed in the mathematics teaching anxiety among mathematics pre-service teachers.



Table 5. Influence of Perceived Professional Development Needs and Emotional Intelligence towards Mathematics Teaching Anxiety

Independent Variables	Unstandardized Coefficients		Standardized Coefficients	T	p-value	Remarks
	B	Std. Error	Beta			
(Constant)	4.907	0.537		9.143	0.000	Significant
Perceived Professional Development Needs	-0.356	0.172	-0.281	-2.083	0.042	Significant
Emotional Intelligence	-0.250	0.186	-0.182	-1.340	0.183	Not Significant
	R = 0.434;	R square = 0.189;	F-value = 11.623;	p = 0.000		

This result conformed to the assertion of Prachagool and Nuangchalem (2021) that several factors, including their conceptual understanding and their perspective of the mathematics subject, may contribute to the anxiety that pre-service mathematics teachers feel when it comes to teaching the subject. Furthermore, it is analogous to the findings of Jenssen et al. (2020), which stated that a lack of the mathematical and conceptual knowledge necessary for pre-service teachers to meet curriculum requirements could all contribute to pre-service teachers' anxiety about teaching mathematics. Likewise, Patkin and Greenstein (2020) pointed out that specialized mathematics education influences the mathematics anxiety of pre-service teachers, and teaching experience is connected with mathematics teaching anxiety.

On the other hand, the result of this supported the claim of Ibaishwa (2014), who stated that emotional intelligence does not significantly predict mathematics anxiety among secondary school students, which corroborates the idea that emotional intelligence does not significantly predict mathematics teaching anxiety. Similarly, it is also aligned with the results of the study of Libbrecht et al. (2014), where emotional intelligence did not predict performance, implying anxiety, in courses on medical subject domains, as the findings of their investigation revealed that emotional intelligence has little to no effect on anxiety. It could be further elaborated that having a high degree of emotional intelligence can be applied to teaching mathematics because it has been contextualized to show that it has no direct impact on the anxiety associated with taking courses in subjects like medicine.

SUMMARY

The major findings of the study are the following:

1. The overall mean on the level of perceived professional development needs is 4.12, with a descriptive equivalent of high and a standard deviation of 0.49.
2. The overall mean on the extent of emotional intelligence is 4.18, with a descriptive equivalent of highly extensive and a standard deviation of 0.47.
3. The overall mean on the level of mathematics teaching anxiety is 2.38, with a descriptive equivalent of low and a standard deviation of 0.62.

4. The test of the relationship between perceived professional development needs and mathematics teaching anxiety and emotional intelligence and mathematics teaching anxiety have r-values of -0.417 and -0.393, respectively, and with p-values less than 0.05 level of significance. Thus, the null hypotheses are rejected.

5. Perceived professional development needs significantly predict mathematics teaching anxiety with a beta value of -0.356. The R square of 0.189 shows that the model predicts 18.9% of the statistical variation observed in the mathematics teaching anxiety among mathematics pre-service teachers. The coefficient of alienation is 81.1%. However, emotional intelligence does not appear to be a significant predictor of mathematics teaching anxiety.

CONCLUSION

The findings of the study provide valuable insights into the interplay between perceived professional development needs, emotional intelligence, and mathematics teaching anxiety among pre-service teachers. Firstly, the results indicate that pre-service teachers perceive a high level of professional development needs and possess a significantly extensive level of emotional intelligence. However, despite the high level of perceived professional development needs and emotional intelligence, they experience relatively low levels of mathematics teaching anxiety. This suggests a complex relationship between these variables, where the perceived need for professional development may act as a mitigating factor against anxiety associated with teaching mathematics. In addition, there is a significant relationship between perceived professional development needs and mathematics teaching anxiety, and emotional intelligence and mathematics teaching anxiety among mathematics pre-service teachers.

Secondly, the study demonstrates a negative correlation between perceived professional development needs and mathematics teaching anxiety, indicating that as the perceived need for professional development increases, the level of anxiety decreases. This highlights the importance of addressing professional development needs to alleviate anxiety among pre-service teachers, particularly in the context of mathematics



teaching. However, emotional intelligence does not emerge as a significant predictor of mathematics teaching anxiety, suggesting that while emotional intelligence is important for overall well-being, it may not directly influence anxiety levels specific to mathematics teaching.

In general, these findings underscore the significance of targeted professional development interventions to address the specific needs of pre-service teachers and mitigate anxiety associated with mathematics teaching. By understanding the relationship between perceived professional development needs, emotional intelligence, and mathematics teaching anxiety, educators and policymakers can design more effective strategies to support the professional growth and well-being of pre-service teachers, ultimately enhancing the quality of mathematics education.

RECOMMENDATIONS

Based on the findings presented, the researcher suggested the following recommendations:

1. Administrators of the higher education institutions under the department/college of teacher education are suggested to provide programs like seminars and training to enhance the adaptive reasoning among mathematics pre-service teachers to enable them to develop mathematical proofs for their students, recast pedagogical practices, and provide co-curricular activities or local professional learning action cell to improve the content knowledge among mathematics pre-service teachers, and sustain the identified established practices for the development of self-awareness among mathematics pre-service teachers.
2. Guidance center heads of higher education institutions may administer social skills tests to the mathematics pre-service teachers so they can understand their students' needs.
3. Mathematics pre-service teachers are suggested to participate in the programs provided by their institution related to the enhancement of their professional development needs and emotional intelligence that may help reduce or even eliminate their anxiety about teaching mathematics.
4. Future researchers may consider the findings of the study to develop interventions that might be needed to identify the other factors that might improve the conduct of perceived professional development needs and emotional intelligence in relation to mathematics teaching anxiety.

REFERENCES

1. Alico, J. C., Maraorao, U. D., & Maraorao, R. D. (2017). *Personal Variables and Anxiety in English and Mathematics: Correlational and Comparative Investigation among Pre-University Students*. *International Journal for Innovation Education and Research*, 5(11), 48-61.
2. Alkan, V., Coşguner, T., & Fidan, Y. (2019). *Mathematics teaching anxiety scale: Construction, reliability and validity*. *International Journal of Assessment Tools in Education*, 6(3), 506-521.
3. Altunkaya, H. (2021). *The Correlation between Emotional Intelligence and Academic Listening Skills of Pre-Service Teachers*. *International Journal of Education and Literacy Studies*, 9(4), 141-152.
4. Bhandari, P. (2020). *An introduction to quantitative research*. Retrieved from Scribbr: <https://www.scribbr.com/methodology/quantitative-research/> on June 10, 2021
5. Barham, A. I. (2020). *Exploring in-service mathematics teachers' perceived professional development needs related to the strands of mathematical proficiency (SMP)*. *EURASIA Journal of Mathematics, Science and Technology Education*, 16(10), em1882.
6. Candido, J. (2019). *Mathematics Self-efficacy and Anxiety as Predictors of Teaching Anxiety among Pre-service Teachers*. (Unpublished Master's Thesis). UM Tagum College, Mabini Street Tagum City, Davao del Norte, Philippines
7. Ertekin, E., & Ucar, B. G. (2019). *A Study on the Relationship Between the Pre-service Mathematics Teachers' Technological Pedagogical Content Knowledge and Mathematics Teaching Anxiety*. *Research on Education and Psychology*, 3(2), 209-224.
8. Flynn, M. (2020). *Understanding the Effects of Mathematics Professional Development on Teachers' Perceptions of Mathematics* (Doctoral dissertation, Walden University).
9. García-Martínez, I., Pérez-Navío, E., Pérez-Ferra, M., & Quijano-López, R. (2021). *Relationship between emotional intelligence, educational achievement and academic stress of pre-service teachers*. *Behavioral Sciences*, 11(7), 95.
10. Gay, L. R., Mills, G. E., & Airasian, P. W. (2011). *Educational research: Competencies for analysis and applications*, Pearson Higher Education. New Jersey, USA: Pearson Higher Ed. <https://doi.org/10.1080/13540602.2018.1457524>
11. Gillo, M. D. (2021). *Attitude, Self-Concept, Study Habits, and Anxiety Towards Mathematics Among Pre-Service Teachers*. *European Journal of Education and Pedagogy*, 2(3), 110-112.
12. Haemer, H. D., Borges-Andrade, J. E., & Cassiano, S. K. (2017). *Learning strategies at work and professional development*. *Journal of Workplace Learning*.
13. Herro, D., & Quigley, C. (2017). *Exploring teachers' perceptions of STEAM teaching through professional development: implications for teacher educators*. *Professional Development in Education*, 43(3), 416-438.
14. Hidi, S., Renninger, K. A., & Krapp, A. (2004). *Interest, a motivational variable that combines affective and cognitive functioning*. *Motivation, emotion, and cognition: Integrative perspectives on intellectual functioning and development*, 89, 115.
15. Ibaishwa, R. L. (2014). *Shyness and emotional intelligence as predictors of mathematics anxiety among secondary school students in Makurdi, Benue state*. *Journal of Educational Policy and Entrepreneurial Research*, 1(2), 11-21.
16. Jenssen, L., Hosoya, G., Jegodtka, A., Eilerts, K., Eid, M., & Blömeke, S. (2020). *Effects of Early Childhood Teachers' Mathematics Anxiety on the Development of Childrens' Mathematical Competencies*. In *Student learning in German higher education* (pp. 141-162). Springer VS, Wiesbaden.
17. Justicia-Galiano, M. J., Pelegrina, S., Lechuga, M. T., Gutiérrez-Palma, N., Martín-Puga, E. M., & Lendínez, C. (2016). *Math anxiety and its relationship to inhibitory abilities*



- and perceived emotional intelligence. *Anales De Psicología/Annals of Psychology*, 32(1), 125-131.
18. Karlberg, M., & Bezzina, C. (2020). The professional development needs of beginning and experienced teachers in four municipalities in Sweden. *Professional Development in Education*, 1-18.
 19. Karunakaran, M. S. (2020). Opportunities to decrease elementary prospective teachers' mathematics anxiety. *The Mathematics Enthusiast*, 17(2), 469-492.
 20. Libbrecht, N., Lievens, F., Carette, B., & Côté, S. (2014). Emotional intelligence predicts success in medical school. *Emotion*, 14(1), 64.
 21. Lo, W. Y. (2021). Pre-Service Teachers' Prior Learning Experiences of Mathematics and the Influences on Their Beliefs about Mathematics Teaching. *International Journal of Instruction*, 14(1), 795-812.
 22. Marbán, J. M., Palacios, A., & Maroto, A. (2021). Enjoyment of teaching mathematics among pre-service teachers. *Mathematics Education Research Journal*, 33(3), 613-629.
 23. McCombes, Shona (2020). Descriptive Research. Published on May 15, 2019. Retrieved from <https://www.scribbr.com/author/shona/page/3/>
 24. McMinn, M., & Aldridge, J. (2020). Learning environment and anxiety for learning and teaching mathematics among preservice teachers. *Learning Environments Research*, 23(3), 331-345.
 25. Olango, M. (2016). Mathematics Anxiety Factors as Predictors of Mathematics Self-Efficacy and Achievement among Freshmen Science and Engineering Students. *African Educational Research Journal*, 4(3), 109-123.
 26. Olson, A. M., & Stoehr, K. J. (2019). From numbers to narratives: Preservice teachers' experiences' with mathematics anxiety and mathematics teaching anxiety. *School Science and Mathematics*, 119(2), 72-82.
 27. Parrish, C. W., Byrd, K. O., Johnson, T. M., Dasinger, J., & Green, A. M. (2020). Middle grades mathematics teachers' mixed perceptions of content-focused professional development. *RMLE Online*, 43(8), 1-16.
 28. Patkin, D., & Greenstein, Y. (2020). Mathematics anxiety and mathematics teaching anxiety of in-service and pre-service primary school teachers. *Teacher Development*, 24(4), 502-519.
 29. Peker, M. (2016). Mathematics teaching anxiety and self-efficacy beliefs toward mathematics teaching: A path analysis. *Educational Research and Reviews*, 11(3), 97-104.
 30. Peker, M., & Ulu, M. (2018). The Effect of Pre-Service Mathematics Teachers' Beliefs about Mathematics Teaching-Learning on Their Mathematics Teaching Anxiety. *International Journal of Instruction*, 11(3), 249-264.
 31. Prachagool, V., Nuangchalerm, P., & Thavornsil, T. (2021). Researching Anxiety of Pre-Service Teachers in Teaching Science and Mathematics Program. *Journal of Education and Learning (EduLearn)*, 15(3), 438-442.
 32. Ruef, J. L., Willingham, J. C., & Sweeny, S. P. (2019). Re-envisioning "good at math." A case study of positive transformation. *International Journal of Gender, Science and Technology*, 11(3), 383-393.
 33. Sanders, S., Nielsen, W., Sandison, C. & Forrester, T. (2019). Maths anxious pre-service teachers' perspectives of "doing" mathematics in a whiteboard room. *Mathematics Teacher Education and Development*, 21 (1), 145-168.
 34. Setiana, D. S., & Nuryadi, R. H. S. (2020). The Correlation between Reasoning and Emotional Intelligence in Social Interaction to Mathematics Achievement. *Jurnal Hipotenusa*, 2, 1.
 35. Shiroani, H. (2019). The relationship between math anxiety and emotional intelligence. *Journal of Basic and Applied Research International*, 168-176.
 36. Sobrevega, L. P., & Arellano, E. R. (2014). Emotional Quotient, Mental Toughness, Mathematics Anxiety, and Performance of Teacher Education Students. *West Visayas State University Research Journal*, 3(2), 1-1.
 37. Stoehr, K. J. (2017). Building the wall brick by brick: one prospective teacher's experiences with mathematics anxiety. *Journal of Mathematics Teacher Education*, 20(2), 119-139.
 38. Subia, G. S., Salangsang, L. G., & Medrano, H. B. (2018). Attitude and performance in mathematics I of bachelor of elementary education students: A correlational analysis. *American Academic Scientific Research Journal for Engineering, Technology, and Sciences*, 39(1), 206-213.
 39. Syuhada, N., & Retnawati, H. (2020, March). Mathematics teaching anxiety in novice teacher. In *Journal of Physics: Conference Series* (Vol. 1511, No. 1, p. 012039). IOP Publishing.
 40. Tinh, P. T., Le, T. T. T., Nguyen, P. T., Le, C. D., Nguyen, M. T., & Nguyen, T. T. (2021). Preparing Pre-Service Teachers for Mathematics Teaching at Primary Schools in Vietnam. *EURASIA Journal of Mathematics, Science and Technology Education*, 17(5), em1966.
 41. Thomas, H. U. N. T., & Sari, M. H. (2019). An English version of the mathematics teaching anxiety scale. *International Journal of Assessment Tools in Education*, 6(3), 436-443.
 42. Turner, K., & Stough, C. (2020). Pre-service teachers and emotional intelligence: A scoping review. *The Australian Educational Researcher*, 47(2), 283-305.
 43. Wu, H. H. (2018). The content knowledge mathematics teachers need. In *Mathematics matters in education* (pp. 43-91). Springer, Cham.