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Anxiety and self-confidence toward mathematics in preservice primary education teachers

Javier Sánchez Mendías [1], **Isidoro Segovia Alex** [2], **Antonio Miñán Espigares** [1]

[1] Dept. of Teaching Methodology and School Organization, University of Granada
[2] Dept. of Mathematics Education, University of Granada

Spain

Correspondence: Isidoro Segovia Alex. Facultad de Ciencias de la Educación. Campus Universitario de Cartuja. C.P. 18071 – Granada. Spain. E-mail: isegovia@ugr.es

Abstract

Introduction The possible presence of negative attitudes towards mathematics in preservice primary education teachers is a matter of concern if we consider that such attitudes will affect their university education and will have an impact on their future teaching practice.

Method. Anxiety and self-confidence towards mathematics, as dimensions of attitude, are analyzed using a descriptive and correlational method. The study sample contained 488 preservice teachers enrolled in the first year of the Primary Education Degree at the University of Granada.

Results. The preservice teachers had a mean anxiety level of 2.76 and self-confidence level of 3.32, out of a possible 5. In addition, the data reflect a high, significant, negative correlation between these two attitudinal dimensions.

Discussion and conclusions. The levels of anxiety and self-confidence obtained are inadequate for proper formation in mathematics. We underscore a need to implement training actions designed to improve confidence and reduce anxiety towards mathematics in this population.

Key words: attitudes, anxiety, self-confidence, mathematics, teacher training.

Resumen

Introducción. La posible presencia de actitudes negativas hacia las matemáticas, en los futuros docentes de Educación Primaria, es un hecho preocupante si tenemos en cuenta que, estas actitudes, van a condicionar su formación universitaria y van a tener incidencia en su futura práctica docente.

Método. Se analiza, de forma descriptiva y correlacional, la ansiedad y la autoconfianza hacia las matemáticas, como dimensiones de actitud, que presenta una muestra de 488 futuros maestros matriculados en el primer curso del Grado de Educación Primaria de la Universidad de Granada.

Resultados. Los resultados reflejan que los futuros maestros presentan un nivel de ansiedad de 2.76 y un nivel de autoconfianza de 3.32 ambos sobre un máximo de 5. Asimismo, los datos reflejan la existencia de una correlación elevada y significativa de carácter negativo entre ambas dimensiones de actitud.

Discusión y conclusiones. Los niveles de ansiedad y autoconfianza obtenidos son inadecuados para el desarrollo de una formación matemática de calidad. Igualmente, destacamos la necesidad de realizar acciones formativas orientadas a mejorar la confianza y a reducir la ansiedad hacia las matemáticas en este colectivo.

Palabras clave: actitudes, ansiedad, autoconfianza, matemáticas, formación del profesorado.

Introduction

The PISA 2018 report continued to report Spanish students' mathematics outcomes below OECD and EU averages, highlighting a need to analyze the causes that place our student outcomes at a distance from countries that show better mathematics achievement. We understand one cause to be that many teachers have a negative attitude towards this subject, which is then passed on to the students (Fennema, 1989; Gómez Chacón, 2000; Hidalgo Maroto & Palacios, 2006; Mensah, Okyere & Kuranchie, 2013; Schenkel, 2009; Sloan, Daane & Gienesen, 2002). This has a direct influence toward students' unfavorable academic achievement and is a contributor to scholastic failure in this subject (Barbero, Holgado, Vila & Chacón, 2007; Bausela, 2018; Beilock, Gunderson, Ramírez & Levine, 2010; Cerda, Romera, Casas, Pérez & Ortega-Ruiz, 2017).

Importantly, many professors in teacher-training programs report that a high number of their students show a negative attitude towards mathematics, and indicate that they personally have had limitations in learning mathematics that go back to their own primary education (Segovia, 2008).

Attitudes are taught, learned and constructed in school and family contexts; they can be easily passed on due to the interaction of students with their teachers, and children with their parents (Sánchez Mendías, 2013). When teachers teach a specific discipline and when parents help their children with homework, they transfer beliefs, behaviors and emotions, whether positive or negative.

Theoretical framework

Uusimaki and Nason (2004) indicate that it is precisely during primary education that attitudes toward mathematics begin to form.

The study of preservice teachers' attitudes towards mathematics during their university training is a subject that continues to arouse interest within educational research, as demonstrated by the numerous studies published in recent years. Some studies have focused on these attitudes in general (León-Mantero, Pedrosa, Maz-Machado & Casas-Rosal 2019; Madrid, Maz-Machado, León-Mantero, Casas & Jiménez-Fanjul, 2016; Nortes & Nortes, 2017a; Sánchez Mendías, 2013; Soneira, Naya-Rivero, De la Torre & Mato, 2016) while oth-

ers have focused on anxiety towards mathematics (Nortes & Nortes, 2014; Novak & Tassell, 2017; Segarra & Pérez Tyteca, 2017). In addition, the relationship between anxiety and confidence towards this subject has been studied (Casis, Rico & Castro, 2017; Nortes & Nortes, 2017b), as well as changes experienced in anxiety towards mathematics during one's university studies (Marbán Maroto & Palacios, 2016; Ruiz, Lupiáñez, Del Rio & Fernández, 2016). Finally, some researchers have outlined teachers' affective-emotional profile with respect to mathematics (Costillo, Borrachero, Brígido & Mellado, 2013; Maroto, 2015; Mizala, Martínez & Martínez; 2015; Nortes & Nortes, 2014).

There has also been interest in the study of attitudes towards mathematics with respect to in-service teachers (Gomezescobar & Fernández-Cézar, 2018; Gresham, 2018; Koch, 2018; Ramirez, Hooper, Kersting, Ferguson & Yeager , 2018), primary school students (Nyroos & Wiklund-Hörnqvist, 2011; Schenkel, 2009; Ashby, 2009), secondary school students (Bausela, 2018; Yara, 2009; Gil, Blanco & Guerrero, 2006); there are even developmental studies that cover more than one stage of education (Hidalgo et al., 2006; Núñez et al., 2005).

Among the attitudes representative of teachers in training, anxiety and self-confidence towards mathematics are the dimensions that have been identified as "descriptors of the personal dimension of attitude towards mathematics" (Casis, Rico & Castro, 2017 p. 184).

Fennema and Sherman (1976) stated that anxiety towards mathematics constitutes a set of feelings of terror, nervousness, and associated physical symptoms that appear when doing mathematics. Likewise, they identify self-confidence towards mathematics as the individual's confidence in his or her own capacity to learn and satisfactorily perform a mathematical task.

León-Mantero et al. (2019) analyzed the attitudes of preservice teachers of Early Childhood Education at the University of Córdoba; the participants indicated that mathematics was a boring subject and that they felt fear about addressing it, despite being aware of its importance.

Gomezescobar and Fernández Cézar (2018) analyzed attitude towards mathematics among in-service teachers of Early Childhood and Primary Education; they assessed the do-

mains of anxiety, liking math, usefulness, motivation and confidence, and also considered how these relate to gender, to stage of education, type of employment contract, years of experience, and whether or not teachers belonged to an online learning community. The authors concluded that there was no relationship to gender or educational stage; however, they did find relationships with teaching experience, employment status, and membership in an online learning community.

For their part, Segarra and Pérez-Tyteca (2017) studied anxiety towards mathematics in preservice primary education teachers at the University of Alicante. Their results reflected that the future teachers presented a medium level of anxiety and that their responses were more intense in testing situations and in problem-solving.

Nortes and Nortes (2017a) examined attitudes of anxiety, motivation and confidence towards mathematics in preservice teachers of Primary Education at the University of Murcia. Study participants presented anxiety levels that exceeded what is considered neutral, and this level increased in testing situations. Regarding motivation and confidence toward mathematics, both were reported as high.

Nortes and Nortes (2017b) analyzed the mathematical knowledge of future primary education teachers and their attitudes towards mathematics, highlighting that the more positive the attitudes of preservice teachers, the better their results on mathematical knowledge tests.

Ruiz et al. (2016) carried out a study to determine level of anxiety towards mathematics in students of the Primary Education Degree at University of Granada, establishing that they had a medium level of anxiety. In addition, they pointed out that teaching practices and the use of nontraditional teaching methodologies helped to lower anxiety.

The aim of the present research was to uncover the attitudes of anxiety and self-confidence towards mathematics held by teachers-in-training at the University of Granada, since they represent the group that will be responsible for teaching mathematical content to upcoming generations. Likewise, studying the correlation between the two variables would help us to know whether, as Çatlıoğlu, Gürbüz and Birgin (2014) establish, preservice teachers with high levels of anxiety have less confidence in their ability to teach mathematics,

which would predispose the development of negative attitudes towards this subject. All this will allow us to learn whether students who choose this university degree have the most suitable attitudinal profile regarding mathematics, or whether formulas should be proposed to improve this profile.

Research objectives

1. To determine the degree of anxiety toward mathematics presented by primary education teachers-in-training at the University of Granada.
2. To establish the level of mathematics self-confidence shown by primary education teachers-in-training at the University of Granada.
3. To establish whether there is a significant correlation between anxiety and self-confidence toward mathematics as attitudinal dimensions.

Method

Participants

Non-probability sampling, also known as convenience sampling, was used; the participating subjects were selected for their adequacy and accessibility to the research.

Participating in the study were 514 first-year students in the primary education teacher training program at the University of Granada. The research was carried out during the first semester of the 2012/2013 academic year. Of the questionnaires that were administered, 26 had to be eliminated due to irregularities in the answers. Therefore, the final sample was established as 488 subjects (N = 488), of which 61.9% were women and 38.1% men. The mean age of the sample was 20.09 years, with a standard deviation de 3.34.

Instrument

The data collection instrument was the scale of attitudes towards mathematics by Fennema and Sherman (1976); it consists of nine attitude categories, from which we selected the categories that assess attitudes of anxiety and self-confidence. The scale was chosen as the one that best adapts to our way of understanding these attitudes, that is, as affective variables

that affect the interest that a student applies to acquiring learning in mathematics and to choosing mathematics in their university studies.

The aforementioned scale has proven validity and reliability, and has been a standard for numerous investigations carried out in recent years in the analysis of attitudes towards mathematics (Frazier-Kouassi, 1999; Gardner, 1997; Kloosterman & Stage, 1992; Leedy, LaLonde & Runk, 2003; Mulhern & Rae, 1998; Pérez-Tyteca, 2007; Pérez Tyteca, 2012; Sánchez Mendías, 2013; Sánchez Mendías, Segovia & Miñán, 2011; Segarra & Pérez-Tyteca, 2017).

Nonetheless, we recalculated instrument reliability for the scales we selected from the original questionnaire, as reflecting internal consistency. Cronbach's alpha coefficient was calculated for each of these as an internal consistency index using the IBM software package SPSS Statistics 19, assessing consistency from the average inter-element correlation. In the case of the dimension of Anxiety towards mathematics, an alpha value = .92 was obtained, while in the dimension Self-confidence towards mathematics, an alpha value = .95 was obtained.

Our questionnaire was then compiled from the "Anxiety towards mathematics" and "Self-confidence towards mathematics" scales, which each include 12 Likert-type items, producing a questionnaire that was composed of 24 items, grouped as follows:

1. Scale of Mathematics Anxiety (Items 1 to 12).
Subscales:
1.1 Anxiety toward mathematics as a discipline. (Items 1, 2, 7, 8 and 12).
1.2 Anxiety toward mathematical problem solving. (Items 3, 9 and 10).
1.3 Anxiety toward being tested in mathematics. (Items 4, 5, 6, and 11).

2. Scale of self-confidence in learning mathematics. (Items 13 to 24).
Subscales:
2.1 Self-confidence as perceived ability (items 13-22).
2.2. Self-confidence as compared to other school subjects (items 23-24).

Procedure

The methodological design proposed for this research was based on the non-experimental quantitative modality known as descriptive research. Hernández, Fernández-Collado and Bautista (2006) considered that, in non-experimental research, phenomena are observed in their natural context of occurrence, and the corresponding analysis is carried out afterward. In this study, we used the two different modalities of survey research and correlational research. We understand this design to be the one that best adapts to the objectives formulated and to the nature of the research itself.

The questionnaires were administered during the first semester of the academic year to freshmen students in primary education teacher training, eleven groups in total, at the Faculty of Educational Sciences, University of Granada. Confidentiality was ensured, since the questionnaire was anonymous, and students were asked to be frank and honest in their answers. A maximum 30 minutes was allowed for them to answer the questionnaire.

Data analyses

The statistical study was completed using SPSS, version 19. Descriptive statistics were calculated (means, standard deviations, maximum and minimum values, and frequencies). Finally, in the correlational analysis, the Pearson correlation coefficient was used to determine the significance of relationships between the dimensions.

Results

There were five possible responses for all scale items. Subjects assigned a score from 1 (totally disagree) to 5 (totally agree). Certain scale items that were formulated in the negative were recoded in order to unify the interpretation criteria of the scores obtained. Thus, a value of 1 shows minimal or no anxiety or self-confidence towards mathematics, while 5 represents very high anxiety or self-confidence on the part of the individual.

Item by item analysis of the Mathematics Anxiety Scale

Table 1 shows means and standard deviations of the items from this scale. The highest mean scores were found for item 4 (3.53), which measures nervousness on mathematics tests; item 3 (3.43), measuring worry about mathematics problem solving; item 2 (3.41), assessing the desire to take more mathematics subjects; and item 5 (3.38), assessing uneasiness

during mathematics tests. As for standard deviation, the item that showed least agreement was number 2 (1.41), while the most agreement was found on number 6 (1.08).

Table 1. *Mean score and standard deviation of items in the Mathematics Anxiety Scale (N=488)*

Items in the Anxiety Scale	***Mean***	***S.D.***
1. Not afraid of math	2.64	1.25
2. Would like to take more math courses	3.41	1.41
3. Not worried about ability to solve math problems	3.43	1.27
4. Almost never gets nervous in math tests	3.53	1.29
5. Usually feels calm in math tests	3.38	1.28
6. Usually feels calm in math class	2.17	1.08
7. Math usually makes him/her feel bothered and nervous	2.52	1.33
8. Feeling of discomfort, restlessness, irritability and impatience about math	2.33	1.28
9. Uneasy when thinking about mathematical problem solving	2.26	1.26
10. Feels blocked when trying to solve mathematical problems	2.31	1.15
11. Feels fear toward a mathematics test	2.67	1.31
12. Feelings of worry and nervousness about mathematics	2.54	1.31

The dimension of Anxiety toward mathematics and its respective subdimensions.

In this section, we provide detailed mean scores and standard deviations of the dimension "Anxiety towards mathematics" and its three subdimensions, obtained from the sum of the mean scores of all items that comprise them. For the dimension of "Anxiety towards mathematics", which has 12 items, a minimum score of 12 and a maximum of 60 can be obtained. Table 2 shows these scores adapted to a scale from 1 to 5, to facilitate interpretation of results; in all cases, a score of 1 represents an absence of anxiety and a score of 5 indicates maximum anxiety.

Table 2. *Descriptive statistics of the dimension: Anxiety toward mathematics, and its respective subdimensions (N=488).*

Dimensions	***Minimum***	***Maximum***	***Mean***	***S.D.***
Anxiety toward mathematics *(Items 1 to 12)*	1.00	5.00	2.76	0.92
Anxiety toward the discipline *(Items 1, 2, 7, 8 and 12)*	1.00	5.00	2.68	1.10
Anxiety toward mathematical problem solving *(Items 3, 9 and 10)*	1.00	5.00	2.66	0.93
Test anxiety *(Items 4, 5, 6 and 11)*	1.00	5.00	2.94	0.99

Results in the dimension of Mathematics Anxiety show a mean value (2.76 of a possible 5) that represents a medium level of anxiety toward mathematics in the sample that was assessed. However, the standard deviation (0.92) indicates substantial dispersion in the data collected.

Regarding the dimension of "Anxiety toward mathematics as a discipline", the mean value (2.68 of a possible 5) shows that the subjects had a medium level of anxiety toward this discipline. Similarly, the standard deviation (1.10) indicates substantial dispersion in the data collected.

In the subdimension of "Anxiety toward mathematical problem solving", the mean value (2.81 of a possible 5) shows that the subjects had a medium level of anxiety toward problem solving. The standard deviation (0.93) indicates lack of agreement in the data collected.

Finally, regarding the subdimension "Mathematics test anxiety"", the mean obtained (2.94 of a possible 5) reveals that the sample has a medium level of anxiety toward mathematics testing. The standard deviation (0.99) reflects dispersion in the data collected.

Item by item analysis of the Mathematics Self-confidence Scale

Table 3 shows means and standard deviations of the items from this scale. The highest mean scores are found in item 15 (4.10), which measures self-assurance in learning mathematics; item 19 (3.75), which evaluates sense of mathematical ability; item 17 (3.69), regard-

ing expectations of success; and item 23 (3.51), addressing mathematics achievement in comparison to other subjects.

Table 3. *Mean score and standard deviation of items in the Mathematics Self-confidence Scale (N=488).*

Items in the Self-confidence Scale	***Mean***	***S.D.***
13. Self-assured when doing math tasks	3.06	1.13
14. Self-assured in approaching complex math tasks	2.88	1.19
15. Self-assured in learning math	4.10	0.97
16. Belief in being able to handle the most difficult math	3.13	1.33
17. Belief in being able to get good grades in math	3.69	1.08
18. Strong self-assurance with regard to math	2.72	1.17
19. Lack of math ability	3.75	1.21
20. Belief that one is unable to handle higher math	3.30	1.41
21. Not the kind of person who does well in math	3.16	1.47
22. Despite studying hard, math seems difficult	3.23	1.32
23. Does well in other subjects but not math	3.51	1.30
24. Math is his/her worst subject	3.29	1.57

Dimension of Mathematics Self-confidence

In this section, we present the mean scores and standard deviations for the dimension “Mathematics self-confidence" and its two subdimensions. These data are obtained from the sum of the mean scores for each of the items that are included. Thus, in the dimension “Mathematics Self-confidence", which includes 12 items, a minimum score of 12 and a maximum of 60 can be obtained. Table 4 presents the data adapted to a scale from 1 to 5, to facilitate interpretation of the results; in all cases, 1 represents minimal self-confidence and 5 indicates the maximum self-confidence.

Table 4. *Descriptive statistics of the dimension: Mathematics self-confidence and its respective subdimensions (N=488).*

	Minimum	***Maximum***	***Mean***	***S.D.***
Self-confidence *(Items 13 to 24)*	1.00	5.00	3.32	1.01
Self-confidence as perceived ability *(Items 13 to 22)*	1.00	5.00	3.30	0.97
Self-confidence compared to other subjects *(Items 23 and 24)*	1.00	5.00	3.40	1.36

The data show that the mean obtained in the dimension “Mathematics self-confidence" (3.32 of a possible 5), shows that the subjects have a medium level of self-confidence towards mathematics. The standard deviation obtained indicates that there is significant dispersion in the data collected (1.01).

In the subdimension “Mathematics self-confidence as a perceived ability”, the mean (3.30 of a possible 5) shows that the sample has a medium level of self-confidence toward mathematics as a perceived ability. The standard deviation (0.97) reflects that there is dispersion in the data collected.

Finally, in the subdimension “Mathematics self-confidence compared to other subjects”, the mean (3.40 of a possible 5) shows that the sample has a medium level of self-confidence toward mathematics in comparison to other academic subjects. The standard deviation (1.36) indicates lack of agreement in the data collected.

Correlational data analyses

Correlations between anxiety and self-confidence toward mathematics

For this purpose, we calculated Pearson's correlation coefficient, because it allows us to measure the degree of association between two variables reported in interval measurements.

Correlations between dimensions were interpreted along two axes: magnitude or strength of the relationship between the variables, and the sign or direction of the relationship (+ or -). In this regard, the magnitude of a relationship is stronger as it approaches 1 or -1, and weaker when it is closer to 0. In any case, a correlation is important when it is statistically significant ($p \leq .01$ or .05, depending on the assumed alpha). The SPSS program by default assumes 1% bilateral, so all correlations with a sig. (bilateral) or $p \leq .01$ will be statistically significant.

There are different perspectives for determining at what *r* value one may assert a linear correlation between two dimensions. However, the most widely used in educational research is that proposed by Bisquerra (1987, p.189), which establishes the following graded levels: $r = 1$ perfect correlation; $.80 < r < 1$ very high correlation; $.60 < r < .80$ high correlation; $.40 < r < .60$ moderate correlation; $.20 < r < .40$ low correlation; $0 < r < .20$ very low correlation; $r = 0$ null correlation.

Taking these considerations into account, we analyzed any existing correlation between the dimensions “Mathematics anxiety” and “Mathematics self-confidence”, with results reflected in Table 5.

In the correlations matrix we can observe how the dimension “mathematics anxiety” (-.85) is very highly but inversely correlated to the dimension “mathematics self-confidence”. Consequently, we may state that the higher the anxiety toward mathematics, the less self-confidence toward this subject, and vice versa. This correlation is associated with $p \leq .01$, in other words, it is statistically significant.

Table 5 *Correlations between the study dimensions*

	Mathematics Self-confidence
Mathematics Anxiety	-.85(**)

** $p < .01$

Correlations between dimensions and subdimensions of anxiety and self-confidence

The correlation data between the dimensions of Mathematics Anxiety and Mathematics Self-confidence are presented in Table 6.

Table 6. *Correlations between the dimensions of Mathematics Anxiety and Mathematics Self-confidence*

	Self-confidence	Self-confidence as perceived ability	Self-confidence compared to other subjects
Mathematics Anxiety	-.85(**)	-.84(**)	-.79(**)
Anxiety toward mathematics as a discipline	-.84(**)	-.82(**)	-.80(**)
Anxiety toward mathematical problem solving	-.75(**)	-.75(**)	-.67(**)
Mathematics test anxiety	-.68(**)	-.68(**)	-.60(**)

** $p < .01$

The dimension "Mathematics anxiety" (-.85) presents a very high, negative correlation (-0.85) to the dimension "Mathematics self-confidence".

In the same way, the dimension "Mathematics anxiety" presents a very high, negative correlation (-.84) to the subdimension "Self-confidence as a perceived ability", and a high, negative correlation (-.79) to the subdimension "Self-confidence compared to other subjects".

Consequently, we may state that the higher the anxiety, the less self-confidence toward mathematics as a perceived ability, and less self-confidence toward mathematics compared to other subjects; and vice versa. This correlation is associated with $p \leq .01$, in other words, it is statistically significant.

On the other hand, the respective correlations of the subdimensions "Anxiety toward mathematics as a discipline" (-.82 and -.80), "Mathematics problem-solving anxiety" (-.75

and -.67) and "Mathematics test anxiety" (-.68 and -.67) with respect to the subdimensions "self-confidence as perceived ability" and "self-confidence compared to other subjects" are also negative; they are somewhat lower, but still statistically significant.

Finally, the dimension "Mathematics Self-confidence" has a very high, negative correlation to the subdimension "Anxiety toward mathematics as a discipline" (-.84), and a high, negative correlation to the subdimensions "Mathematics problem-solving anxiety" (-.75) and "Mathematics test anxiety" (-.64), with both being statistically significant.

Discussion and Conclusions

Analysis of the study results showed that preservice primary education teachers showed a medium level of anxiety towards mathematics, amounting to 2.76 on a 5-point scale. A level of 1, however, would mean the absence of anxiety, and this is the ideal for carrying out adequate educational practice in the teaching of this discipline. This fact is relevant because this group will be responsible for the mathematical training of boys and girls between the ages of 6 and 12 in their upcoming professional practice.

The data obtained here concurs with other research studies where data were collected using the same scale. Thus, in Nortes and Nortes (2017a), the mean level of anxiety was 3.01; in Pérez Tyteca (2012) it was 2.91; in Sánchez Mendías, Segovia and Miñán (2011), 2.74; and in Segarra and Pérez Tyteca (2017), 2.66. Likewise, in Guillory (2009), mean anxiety level was 3.17, and in Rayner, Pitsolantis and Osana (2009), it came to 2.72. However, in these last two studies, a different scale was used to measure anxiety towards mathematics (Revised Mathematics Anxiety Scale), developed by Alexander and Martray (1989). Taken as a whole, all these studies confirm the presence of a medium level of anxiety toward mathematics in this group.

This same scenario is repeated in each of the subdimensions of anxiety towards mathematics, studied separately (mathematics as a discipline, problem solving and testing); in other words, preservice primary education teachers show a medium level of anxiety in each of them. Moreover, a slightly higher level of anxiety is observed in mathematics testing, in the affective response shown by the subjects. This question is highly relevant insofar as "assessment is the most powerful component of the system and, consequently, the model used for

conducting assessment expels all others and becomes the owner of the system" (Goñi, 1997, p. 5).

The results in self-confidence towards mathematics indicate that, globally, preservice teachers show a medium level of self-confidence towards this subject, that is, 3.32 on a 5-point scale, 5 being the score that represents the maximum level of self-confidence. This implies that future teachers must improve their self-confidence, so that in their teaching practice, they do not encourage the development of negative attitudes. These results follow the line of other studies that have used the same data collection scale. Thus, in Nortes and Nortes (2017b), the mean level of self-confidence was 3.96; in Perry (2011) it was 3.35; in Pérez Tyteca (2012), 2.995; and in Kalder and Lesik (2011), 2.974.

In the attitudinal aspects of self-confidence towards mathematics, results were similar to those obtained for the overall dimension; adjusted to a five-point scale, the mean scores were 3.30 for self-confidence as perceived ability and 3.40 for self-confidence in mathematics compared to other school subjects. Consequently, these preservice teachers initiated their university training with the perception of not being overly sure of themselves in mathematics, and of having limited ability in this subject.

Students' degree of mathematics self-confidence is one of the affective factors with greatest influence on their learning and their ability in this subject. It is therefore often used to explain differences between subjects in achievement, performance and participation in mathematics (Leung & Man, 2005; Malmivuori, 2001).

The level of mathematics self-confidence is of concern, especially when that level is low, since a future teacher is expected to be confident in his or her ability to learn and subsequently teach mathematics to their future students (Isiksal, 2005).

Teachers' attitudes can predispose the attitudes of their students (Fennema, 1989). Therefore, if a teacher appears insecure when dealing with a certain area, in this case mathematics, it can lead the students to acquire an inadequate perception of their own ability to learn mathematics.

As we pointed out previously, we are dealing with a group that does not have a very high level of mathematics confidence to fulfill a teaching function that would foster development of positive attitudes of assurance and confidence toward this discipline --and so contribute to better student achievement.

Some research studies have concluded that negative attitudes towards mathematics play a greater role as the subject proceeds through the different stages of education; initially there is a more favorable affective response towards this discipline (Ashby, 2009; Auzmendi, 1992, Hidalgo et al., 2006). It is therefore especially important that, during Primary Education, teachers manifest attitudes that reflect assurance and confidence when they are teaching mathematics content.

If we succeeded in preparing future teachers that showed high levels of mathematics self-confidence, it is very possible that inappropriate levels of anxiety would disappear, thus preventing a negative influence on their students and contributing to their improved achievement.

When seeking to establish any possible significant correlations between the attitude dimensions (anxiety and self-confidence) and their respective subdimensions, Pearson's correlation analysis indicated that anxiety and self-confidence correlated significantly and negatively with each other. These data concur with those obtained by other researchers (Bursal & Paznokas, 2006; Caballero, Blanco & Guerrero, 2008; Fennema & Sherman, 1978; Isiksal, Curran, Koc & Askun, 2009; Pérez Tyteca, 2012). However, our study differs from previous work in being specific to teacher training in Primary Education, and to preservice teachers at the University of Granada.

In summary, this study reflects the existence of a negative influence from anxiety, affecting the level of self-confidence that future teachers manifest towards mathematics. Due to these teachers' anxiety towards mathematics, we may assert that they lack the level of self-confidence necessary to teach this discipline in a favorable context for developing positive attitudes in their future students. To improve teaching effectiveness, confidence must be increased, while anxiety is reduced. In a recent study linked to sports psychology, Saez, Ocampo and Ariza (2019) studied these same variables (anxiety, self-confidence) when learning

sports techniques; they obtained results that point in this same direction and could be extrapolated to the teacher training.

During professional specialization, if we take formative actions aimed at increasing self-confidence and reducing anxiety, we will be training teachers with positive attitudes that will be perceived by their students. Along these lines, there have been some proposals for reducing anxiety in this group (Blanco, Caballero & Guerrero, 2009; Guerrero & Blanco, 2004; McCulloch, 2001; Molina, Segovia & Flores, 2010; Plaisance, 2007; Ruiz et al., 2016); however, strengthening self-confidence may be a better starting point for reducing anxiety, and for achieving more effective teaching.

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