



Assessment of the Attitudes towards Mathematics of the Students for Teacher of Primary Education

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Abstract

Attitudes of teachers in training towards mathematics may influence their future professional performance. Therefore, in this work, it has been done an exploratory study that aims to know which the attitudes towards mathematics of students who are in their first year of the Primary Education degree from the University of Cordoba at the beginning of their studies on this subject are. The results of this research show that even though the students value mathematics positively and they consider it useful and necessary to their training, his subject also makes them feel anxiety and little liking. It also shows differences in both anxiety and little liking between women and men.

Keywords

Attitudes, Mathematics, Teachers in Training, Primary Education Degree, Mathematics Education

Subject Areas: Education

1. Introduction

The training of primary school teachers is essential to ensure the transmission of knowledge in society since the earliest years of people's education. For this reason, it is not only important for students to acquire knowledge for their future as teachers, but also the attitudes they have towards certain subjects or contents because these may influence the way how they teach.

Depending on the educational or professional field in which you ask about mathematics different valuations will be obtained; they will be influenced by the experience or the knowledge of each person, which will create in them varied beliefs and attitudes towards mathematics.

Emotions, conceptions and attitudes of the students influence their process of learning mathematics, but they

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affect on this learning differently. McLeod and Ortega [1] note that beliefs are mainly cognitive in nature and they are built over a relatively long period of time; while emotional responses have a much stronger emotional component and can appear suddenly. On the other hand, attitudes are the predisposition that the subject has toward something.

According to Gómez [2], emotional issues play an important role in the teaching and learning of mathematics and many have a strong rooting in the subjects so they are not easy to move during the phase of instruction.

Some studies have shown that the knowledge and the attitudes that the student for teachers have about teaching is influenced by their own learning experiences during his time as pupils in primary and secondary education and these are the ones that they show when they enter their university cycle [3] [4].

During compulsory education, students receive basic mathematics knowledge which should serve as a starting point for the future degree they wish to carry out one day. In most cases, students are not sure why these mathematical skills are useful, in part because sometimes they have been transmitted to them out of context and without connections to the real world. Also, many of them have not yet decided which degree they wish to study at university so they are unaware of the importance of mathematics in certain university degrees. However, when they start their university studies, they should have already evaluated and investigated what is the scope of the chosen degree, what are the subjects they should take and, therefore, if there is a significant percentage related to the mathematical world, and if this is the case they should assume a positive attitude towards mathematics [5].

Attitude towards mathematics is the predisposition of students to act positively or negatively towards mathematics, which ultimately determines their intentions and influences their behaviour during the subject [6]. McLeod [7] refers to the convenience of adopting the attitude term to refer to math anxiety, confidence, frustration and satisfaction.

On the other hand, when people are inquired about the usefulness of mathematics, it is referring to how useful they believe mathematics is for their personal life and their work or professional development [8]. Several studies indicate that attitudes consist of at least three components: cognitive, emotional and behavioural [9]-[11].

It is necessary to note that it is not the same to talk about attitudes toward math that to talk about mathematics attitudes. The first are associated with appreciation, satisfaction, curiosity and interest in mathematics and its learning [2] [12]. The second refers to the capabilities of the subjects and the ways in which these use them in a given situation.

In some studies about attitudes towards mathematics it has been found that these are not static, they are evolving over time due to various factors [13] [14]. That is, attitudes are not necessarily immutable; they are modified partially or totally according to the personal experiences.

Research shows that students are becoming aware of their motivations or frustrations towards mathematics since the early years and the anxiety that it is generated in them will increase as they pass through the courses [15]-[17].

On the other hand, studies about the relationship between achievement and attitudes towards mathematics found that, in general, attitudes were negative and these were related to low achievement [18] [19]. Bakar *et al.* [20] establish five factors that influence the attainment of achievements in mathematics: motivation, attitude, peer influence, gender and ethnic group to which the student belongs. Moreover, Peker and Mirasyedioğlu [21] found that different attitudes towards mathematics show significant differences according to different styles of learning that teachers have experienced during their teacher training in mathematics.

At the level of compulsory secondary education, Mato and De la Torre [22] found that attitudes towards mathematics varied depending on the type of educational centre of the students: public, private or private but receiving state subsidies.

In Spain, there have been some studies about attitudes towards mathematics in teachers in training. Nortes and Martínez [23] established correlations between attitudes and academic achievement of these students. The studies of Hernández and Socas [24], Hernández, Palarea and Socas [25] revealed that more than half of the students felt unsafe in mathematics and they also considered it a repulsive subject. Fernández and Aguirre [26] found no correlation between the type of higher secondary-education course completed by the student for teachers or their gender and the attitudes that they showed towards mathematics.

Brown and Baird [27] show both conceptions and attitudes of teachers affect the learning and the relationships that their students establish towards mathematics. We therefore, consider it necessary and interesting to know what are the attitudes towards mathematics of the students who will be future teachers, because they are

entering college to study a degree in which they will not only learn mathematics, they will be prepared to have the ability to impart this subject in the future. Under this premise, we carry out a study in this regard.

2. Methodology

This is an exploratory study that aims to determine which attitudes towards mathematics of the university students to be primary school teachers are.

Population and sample:

Population is formed by all the students of primary education degree from the University of Cordoba. The sample consists of a group of 277 first-year students of the degree of primary school who were coursing mathematics during the year 2014/2015. There were 112 men and 165 women aged 18 to 48 years; the mean age of the students was 20.25 years-old. The participation of students to complete the scale was voluntary and anonymous, so the sample was intentional and for convenience.

The reason we chose only first-year students is related to the planning of the Degree in Primary Education from the University of Cordoba. During their first year, students read mathematics, while in their second and third year they attend subjects about didactic of mathematics. We only chose first-year students so students who have already received studies about didactic of mathematics were not part of the sample, we wanted to avoid that their knowledge about didactics influence their attitude towards mathematics.

It was applied a scale to measure attitudes, type Likert, towards mathematics. The Likert scale was chosen because they are the most widely used to measure attitudes [28]. The scale used for this study was designed by Auzmendi [18] who validated it with a sample of 1221 Spanish students and it has been applied for researches about attitudes towards mathematics in different levels and degrees [5]. This scale consists of 25 questions with the following score options: Strongly Disagree = 1, Disagree = 2, Neutral (Neither agree nor disagree) = 3, Agree = 4, and Strongly agree = 5.

The questions are grouped into five dimensional factors: Anxiety, Value or utility, Liking, Motivation and Security-Trust. To determine the reliability of the test, Cronbach's alpha was obtained ($\alpha = 0,887$), being revealed that in its set the scale possesses a good consistency

The mean score of each factor was recorded to obtain the valuations in terms of favourable/unfavourable. So to $\bar{x} \leq 2$ it was coded as very unfavourable, $2 < \bar{x} \leq 3$ as unfavourable, $3 < \bar{x} \leq 4$ favourable and $4 < \bar{x} \leq 5$ very favourable.

When working with a non-random sample, to verify whether there were significant differences by gender in relation to attitudinal factors, it was carried out a nonparametric Mann-Whitney U test for independent samples.

3. Results

Table 1 presents the descriptive statistics for the study. The average level of the attitudes of students to teacher is 3.18. Question 9 "I enjoy talking to others about mathematics" was the one that obtained the lowest average rating of the full scale, while question 20 "It gives me a great satisfaction to be able to solve math problems" was the one that obtained the highest average rating. It should also be noted that Question 1 "I consider mathematics as a very necessary subject in my studies" is highly rated. This reveals that students are aware of the value of mathematics in their teacher training.

About the positive attitude towards mathematics, it was found that 93.14% of students have globally a positive attitude (**Figure 1**), and only 0.36% have a very unfavourable attitude toward them.

The analysis of the five factors which were aimed to measure on the scale reveals that anxiety is the attitude that gives a greater average rating in contrast to the pleasure that is the least valued (**Table 2**).

In **Figure 2** it is shown how, despite 82.67% of students gives a positive assessment to the confidence towards mathematics, also 52.71% of them states that it causes them great anxiety and this factor has the most unfavourable value of the five factors measured. Students feel motivated, 65.35% gives this factor a positive evaluation while they also present little liking for mathematics as 73.54% of them noted. As for the utility factor 63.89% valued it as positive.

Analysing the answers given by the students considering their gender, it is observed that there are no major differences in average ratings for factors (**Table 3**), giving the biggest difference between men and women in the anxiety factor. When performing the Mann-Whitney U test for independent nonparametric samples with a confidence level (α) = 0.05, no significant differences between the scores of attitudes toward four factors

Table 1. Global descriptive statistics about the attitudes towards mathematics of students to teacher.

Question	N	Mean	Standard Deviation
P1	277	4.03	0.894
P2	277	3.04	1.252
P3	277	3.15	1.134
P4	277	2.70	1.081
P5	277	3.44	1.110
P6	277	3.52	1.020
P7	277	2.86	1.374
P8	277	3.13	1.133
P9	277	2.03	0.981
P10	277	3.55	1.281
P11	277	3.58	0.988
P12	277	3.26	1.083
P13	277	3.03	1.082
P14	277	2.82	1.089
P15	277	3.21	1.109
P16	277	3.09	1.135
P17	277	3.16	1.231
P18	277	2.93	1.119
P19	277	2.71	1.203
P20	277	4.04	1.049
P21	277	3.21	1.041
P22	277	3.21	1.173
P23	277	3.81	1.069
P24	277	2.65	1.181
P25	277	3.38	1.020

Table 2. Descriptive statistics about the attitude towards mathematics factors.

Factor	Number of Questions	Mean	Standard Deviation
Anxiety	9	27.77	7.005
Liking	4	10.19	3.533
Utility	6	19.76	4.023
Motivation	3	10.37	2.696
Trust	3	11.43	2.284

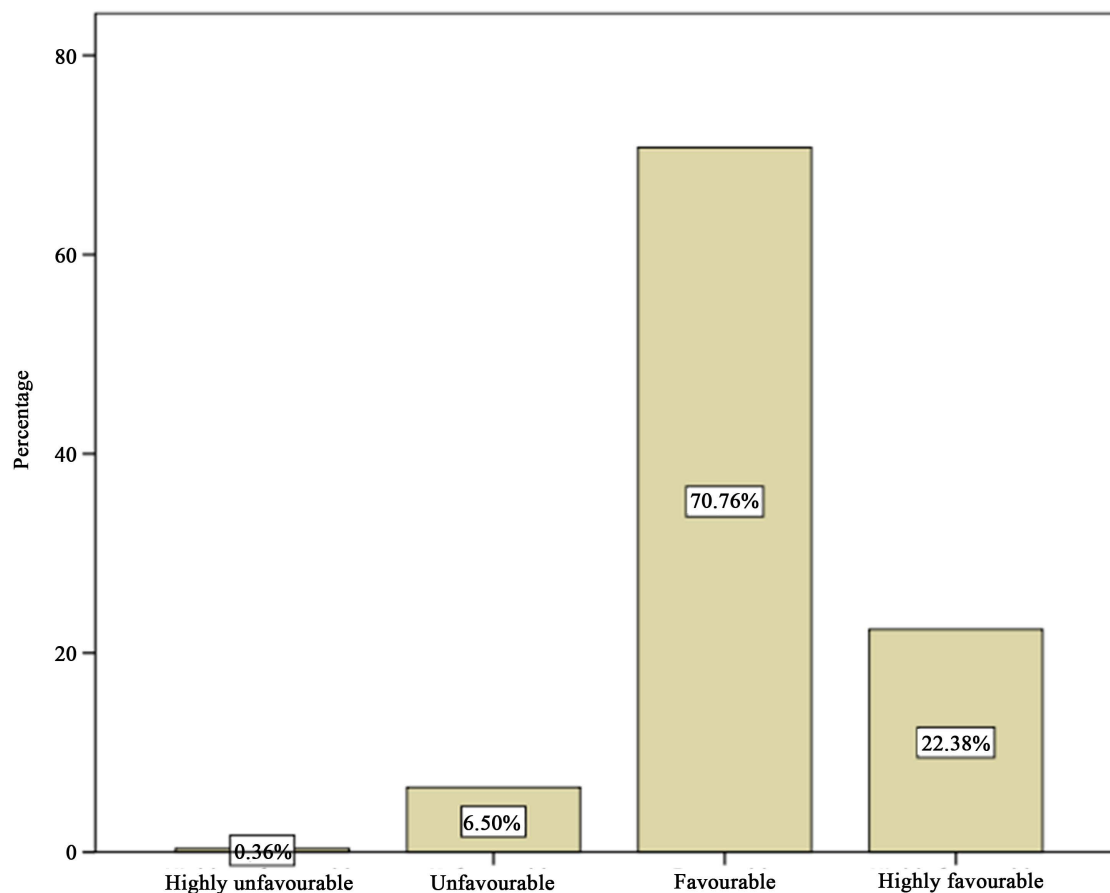


Figure 1. Attitude towards mathematics.

Table 3. Frequency factors by gender.

Factors	Gender							
	Men			Women			Total	
	Mean	N	Standard Deviation	Mean	N	Standard Deviation	Mean	N
Utility	3.218	112	0.64957	3.343	165	0.68166	3.293	277
Anxiety	3.250	112	0.75440	2.973	165	0.77680	3.085	277
Liking	2.533	112	0.90699	2.557	165	0.86937	2.547	277
Motivation	3.360	112	0.89391	3.521	165	0.89888	3.456	277
Trust	3.866	112	0.71933	3.769	165	0.78831	3.808	277

were obtained: Utility, Liking, Motivation and Confidence. But for the anxiety factor a p -value = 0.002 < 0.05 was obtained, rejecting the null hypothesis H_0 : The distribution of Anxiety is the same across categories of Gender, therefore the differences are statistically significant for the factor Anxiety (Figure 3).

Within the limitations of the study, we should note that the scale does not include any questions to indicate whether the student had failed some subject of mathematics in compulsory education or at university, and therefore, we could not control the noise that including these students could generate in the final results. Also the test was anonymous so it was not possible to establish relationships of achievement regarding the factors investigated.

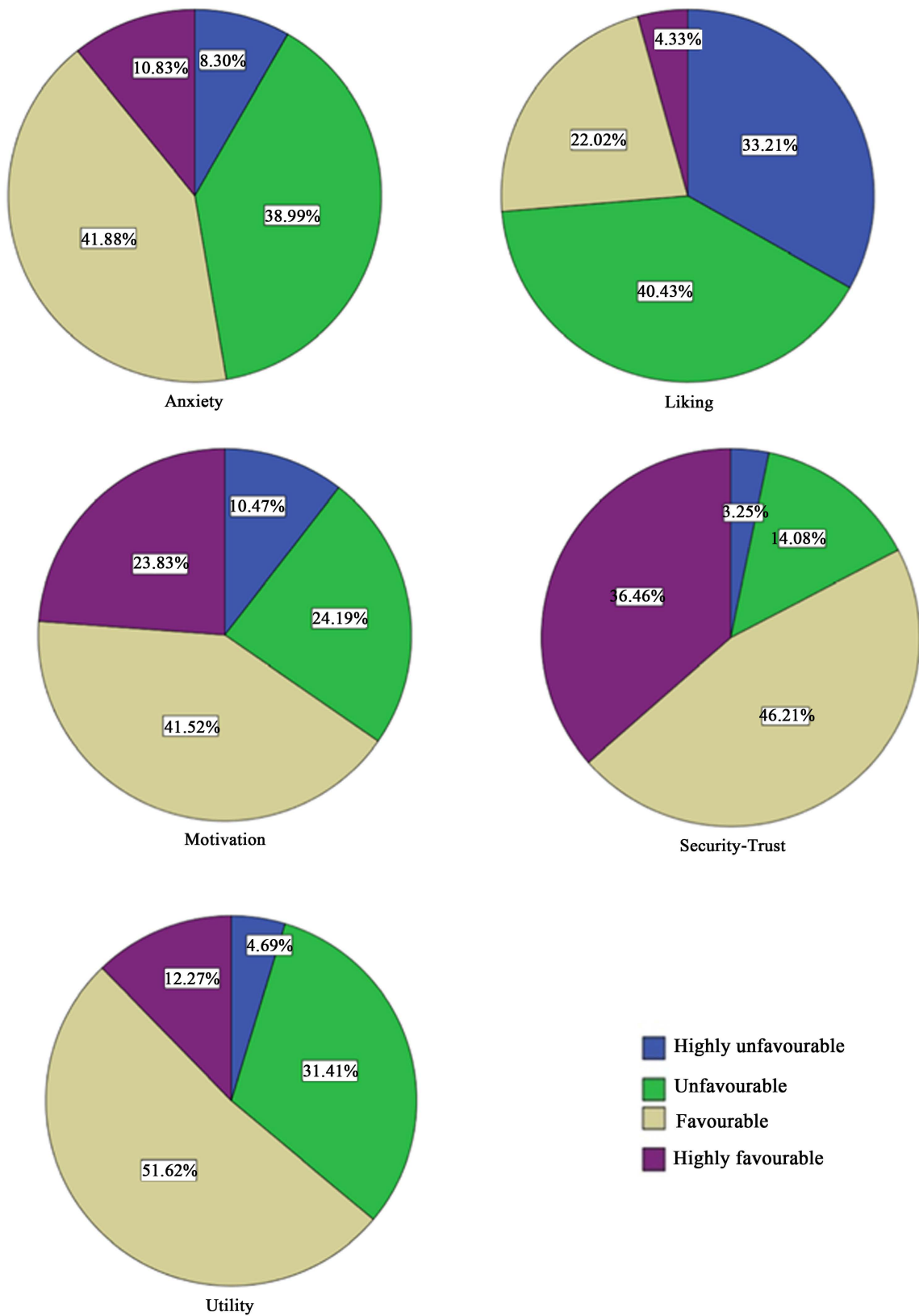


Figure 2. Attitude towards mathematics for each factor.

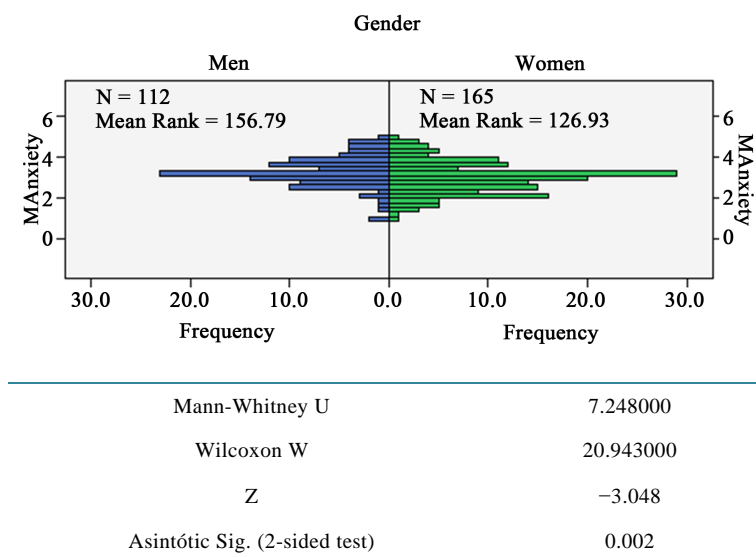


Figure 3. Independent-samples Mann-Whitney U test for gender-anxiety.

4. Conclusions

Attitude towards mathematics is the predisposition of students to act in a certain way regarding to this subject. It is ultimately the appreciation, satisfaction, curiosity or interest aroused in them by mathematics and its learning. This attitude will influence not only in their behaviour toward the subject, but also likely in those times when the student requires math skills either in their work or living environment. This study has revealed that students who are studying to be teachers of primary education from the University of Cordoba value positively mathematics; they obtain satisfaction when they solve mathematical problems and they give it importance within the academic training they should receive for their future teaching performance.

In relation to the five attitudinal factors which are measured, students feel secure and motivated; they think mathematics is useful, giving a positive rating to these factors. However, the study has shown that mathematics generates anxiety and little liking in them. Also, this anxiety is higher in men than in women.

As a future line of work, it remains to be investigated if when the students advance within their university period these attitudes change or remain unchanged over time and compare the results with subjects of similar characteristics in other universities.

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