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*Attitudes of Portuguese teachers
towards statistics: a qualitative analysis*

José Alexandre dos Santos Vaz **Martins**   **jasvm@ipg.pt**
Instituto Politécnico da Guarda (UDI-IPG, CM-UTAD), Portugal

Maria Manuel da Silva **Nascimento**   **mmsn@utad.pt**
Univ. de Trás-os-Montes e Alto Douro (CM-UTAD), Portugal

Assumpta **Estrada** Roca   **aestrada@matematica.udl.cat**
Universitat de Lleida, Spain

Attitudes of Portuguese teachers towards statistics: a qualitative analysis

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◘ **Introduction**

This work is part of a study of teachers of 1ʳˢᵗ (ages 6–9) and 2ⁿᵈ (ages 10–11) cycles of basic Portuguese education, and their attitudes towards statistics.

Here we will do:

A brief summary of the current understanding of attitudes towards statistics and the SCALE OF ATTITUDES TOWARDS STATISTICS OF ESTRADA (*EAEE*);

An exploratory qualitative content analysis of the reasons and motivations that in-service Portuguese teachers, in the 1ʳˢᵗ cycle of basic education, gave in response to some open-ended items from the EAEE scale, in order to get a first glimpse over a better understanding of teachers' attitudes towards statistics.

◘ **Attitudes towards statistics**

The mathematics and statistics learning process

involves a great complexity of factors,

where cognitive and affective factors converge.

the *attitudes* emerge as a variable that exerts a great influence on

the structure, organization and retrieval of information

through the interests' process, constructing meanings, and storing information in the memory.

So attitudes are revealed as a key factor in improving the learning process. **(Estrada, 2009)**

◘ **Attitudes towards statistics**

We take into consideration Philipp's (2007) description of *attitudes* as

> *manners of acting, feeling or thinking that show a person's disposition or opinion, who suggested that attitudes are more cognitive than emotions and change more slowly.*

Attitudes may involve **positive or negative feelings** that can result from **positive or negative experiences** during the time of learning a subject (like statistics).

◘ **Attitudes towards statistics: instruments**

Over the last three decades, various tools to measure attitudes toward statistics have been developed.

These scales have been validated using samples of students at college or university, but not among teachers or future teacher.

Estrada (2002) proposed, validated and developed the **Scale of Attitudes Towards Statistics** (*EAEE*), which was applied to prospective and in-service teachers.

◘ **Attitudes towards statistics: instruments**

The *EAEE* is a combination of three scales:

the SAS (Roberts and Saxe, 1982) ,

the ATS (Wise, 1985) and

the Spanish scale proposed by Auzmendi (1992)

The *EAEE* scale has 25 items

14 affirmative and

11 negative

◘ **Method and results**

The *EAEE* (Estrada, 2002) was translated and adapted to the Portuguese language by an expert board of judges.

All of the items comprised statements, to which the respondents marked their level of disagreement or agreement on a
5 - point Likert type scale
(1- Total disagreement to 5- Total agreement).

◘ **Method and results**

For the 11 items that were associated
to ***negative attitudes, the scale was reversed*** **when**
the responses were analysed,

meaning that at the end the scores
1 or 2 to negative attitudes towards statistics,
3 to neutral attitudes and
4 and 5 to positive attitudes.

9 open-ended written justifications of some of
the *EAEE scale* items were added.

◘ **Method and results**

Here **we present the analysis of the**
reasons/motivations for *5 of those items*.

We established the content analysis
categories based on

the common written (Krippendorff, 2004) and

therefore lexical (Bardin, 2004) reasons/
/motivations

in the responses to the open-ended items
analysed.

◘ **Method and results**

The survey

→ **done during September/October 2010**

→ **493 replies of which 181 (37%) had justified *at least one of the 5 referred items***

→ **these 181 teachers**

- **mainly women (80%)**
- **aged between 26–62** years, (mean 45;SD 7.4)
- **almost 40% stated that they had**
  no statistical training or
  had learned by themselves

◘ **Method and results**

We decided *to remove all the neutral scores (3)* from the content analysis.

We analysed separately answers related to positive attitudes and answers related to negative attitudes.

Item 1 – "Statistical information transmitted in television programmes bothers me."

A total of 180 teachers score this item

65 (36%) neutral →*were removed*

39 (22%) related to positive attitudes (disagree)

76 (42%) related to negative attitudes (agree)

Item 1 – "Statistical information transmitted in television programmes bothers me."

Positive Attitudes		
Categories	f_i	%
0 – Non informative	11	28
1 – No interest in TV' s Information	3	8
2 – Without confidence in TV' s information	12	31
3 – With confidence in TV' s information	13	33
	39	

Negative Attitudes		
Categories	f_i	%
0 – Non informative	11	14
1 – No interest in TV' s Information	3	4
2 – Without confidence in TV' s information	19	25
3 – Reality and statistical outcomes don't match	43	57
	76	

Item 7 – *"I have fun in classes in which I teach statistics."*

A total of 166 teachers score this item
64 (39%) neutral → were removed
64 (39%) related to positive attitudes (agree)
38 (22%) related to negative attitudes (disagree)

Positive Attitudes		
Categories	f_i	%
0 – Non informative	18	28
1 – For the teacher classes are interesting/challenging	22	34
2 – For the students classes, as teachers portrays them	24	38
	64	

Negative Attitudes		
Categories	f_i	%
0 – Non informative	17	45
1 – Lack of motivation	10	26
2 – No statistical knowledge at all	3	8
3 – Classes are a *serious* matter/thing	8	21
	38	

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Item 14 – "I do not use statistics outside of school"

A total of 175 teachers score this item
40 (23%) neutral →were removed
41 (23%) related to positive attitudes (disagree)
94 (54%) related to negative attitudes (agree)

Positive Attitudes		
Categories	f_i	%
0 – Non informative	17	41
1 – Used/needed with/according to day to day situations	10	24
2 – Statistics is everywhere in day to day life	13	32
3 - Uses statistics in work but does not recognize it in everyday life	1	2
	41	

Negative Attitudes		
Categories	f_i	%
0 – Non informative	54	57
1 – Doesn't use statistics	30	32
2 – Only uses indirect information	2	2
3 – Sometimes uses statistics in everyday life	7	7
4 – No statistical training	1	1
	94	

Item 22 – "We should not teach statistics in schools"

A total of 177 teachers score this item
44 (25%) neutral →were removed
125 (70%) related to positive attitudes (disagree)
8 (5%) related to negative attitudes (agree)

Positive Attitudes		
Categories	f_i	%
0 – Non informative	51	41
1 – Utility of statistics	55	44
2 – Importance of statistics	3	2
3 – Likes statistics	16	13
	125	

Negative Attitudes		
Categories	f_i	%
0 – Non informative	6	75
1 – Feelings of the teacher	1	13
2 – Too soon to be taught	1	13
	8	

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Item 23 – "I usually explain statistics problems to my colleagues if they do not understand"

A total of 173 teachers score this item
- 65 (38%) → neutral → *were removed*
- 23 (13%) → positive attitudes (agree)
- 85 (49%) → negative attitudes (disagree)

Positive Attitudes		
Categories	fi	%
0 – Non informative	12	52
1 – To help others	3	13
2 – Cooperative work	7	30
3 – In the past	1	4
	23	

Negative Attitudes		
Categories	fi	%
0 – Non informative	50	59
1 – Seldom happens	21	25
2 – Not enough statistical knowledge, no training	11	13
3 – Statistics is only used in classes	1	1
4 – Almost everyone understands statistics	2	2
	85	

◘ **Final remarks**

This results can't be generalised.

In general, a large number of teachers didn't present theirs reasons/motivations.

Item 1 – "Statistical information transmitted in television programmes bothers me."

The reasons presented show that teachers mainly think that there are misuses of statistics in the information transmitted in television programmes.

So we think that media (papers, TV, etc.) information is a good field to explore among students/teachers, once again, revealing the importance of knowing/learning statistics to build conscientious and participative citizens.

◘ **Final remarks**

Item 7 – "I have fun in classes in which I teach statistics."

      Many teachers showed a positive attitude, which is a promising attitude toward statistics in classroom and also a way to influence students and other teachers.

      For those who had demonstrate a negative attitude it's clear some lack of motivation and/or knowledge, sometimes hidden under the mask of a *serious matter*.

In our view it is urgent to solve the lack of knowledge problem and try to "motivate" with real data collection and projects in the statistical training of those teachers.

◘ **Final remarks**

Item 14 – "I do not use statistics outside of school"

      The statistical literacy issue emerges: in most of the justifications, even for positive attitudes, teachers make a clear distinction between school/work and everyday life.

We think it is crucial to include and highlight the statistical literacy in teaching and training statistics for the/with 1st cycle teachers.

◘ **Final remarks**

Item 22 – "We should not teach statistics in schools"

The teachers' attitude is strongly positive because they consider that it is useful, and necessary to teach and learn.

There is also a group of teachers that includes students in their love for statistics, and these statements are promising for teaching and learning statistics.

The 2 statements from the 8 teachers who had a negative attitude showed different justifications:

"I think that my indifference is due to my lack of training so I wouldn't like it that students have the same feelings that I have".
"In this [1rst] cycle it is too soon to work on statistics" (and we notice: even if it is an international trend).

◘ **Final remarks**

Item 23 – "I usually explain statistics problems to my colleagues if they do not understand"

Teachers have a general negative attitude in this item.

They state of their own lack of training and knowledge in statistics and

they also wrote that they were not available to work cooperatively in statistics (mathematics).

Once again it seems important improve the statistical training and develop the cooperative work among teachers.

◘ **Final remarks**

**Finally, it is a good opportunity to work/to continue working
for and with teachers
(without forgetting the affective component,
that also directly involves their attitudes),**

whilst also profiting from the full implementation of the programmes of Mathematics in the Basic Education in Portugal, since 2010/11.

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STATISTICS is good for you

Thank You!

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