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Tourism students' Attitudes Toward Statistics

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ABSTRACT

Since tourism entered in higher education, statistical skills have frequently been included in tourism curricula, with due recognition of their importance in student training. But apart from acknowledgement of that fact, the motivation of this paper was the conviction that tourism students need to have statistical literacy; this is understood not only as the acquisition of knowledge about tools of statistical analysis, but as the development of statistical reasoning, since that is relevant for the students' career. However, the majority of tourism students do not have strong mathematical training, and they do not show an inclination for quantitative methods. In this context, attitudes are crucial for the learning process. Negative attitudes towards a subject of study can often become an obstacle to effective learning, and there is a common belief that attitudes towards Statistics are negative. This paper focuses on evaluating the attitudes of university students enrolled in Tourism management studies, using a self-administered survey to students of the Degree in Tourism at the University of the Balearic Islands. To our knowledge, there are no other studies of this type related to this university major, despite the importance of acquiring statistical skills for tourism professionals. The survey instrument includes the Survey of Attitudes towards Statistics (SATS©), along with some questions regarding demographic and academic characteristics of the respondents. An Exploratory Factor Analysis (EFA) has been conducted on the SATS© items, seeking to identify the underlying dimensions of tourism students' attitudes towards Statistics. The relationship between attitudinal components and the demographic and academic characteristics of students has also been investigated. From the results, recommendations emerge for teaching and learning, as well as for the improvement of attitudes towards Statistics in Tourism studies in particular, and in Social Science degrees in general.

1. Introduction

It is often the case that tourism curricula, whether they have a more vocational or a more liberal orientation, include the learning of statistical concepts and practices, or of research methodologies in general. Very often this knowledge is considered necessary, as it contributes to the acquisition of certain technical and analytical skills. However, it must be recognized that the acquisition of statistical knowledge also contributes to the development of transferable skills such as for example critical thinking, problem-solving and decision-making, which are considered indispensable (Connolly & McGing, 2006). Although the more usual vocational orientation of bachelors in tourism places greater emphasis on people management skills (Kokt & Strydom, 2014), this paper aims to

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highlight the importance of acquiring analytical skills that go beyond students' preparation for their professional careers and a building of their capacity of reflection. As future tourism professionals, students must acquire analytical and information management skills that can support the problem-solving and decision-making processes they must carry out. They have to be prepared to make informed and evidence-based decisions, and be able to monitor the results and outcomes of their actions, especially when they are immersed in the information society. It is thus necessary for students to have statistical literacy in their training. Statistical literacy is an ability citizens should have in information-based societies (Gal, 2002). It refers to their knowledge about how to understand and assimilate statistical information, as well as to their awareness of where to look for it; they should be able to understand reports and readings, be familiar with basic terms and concepts of Statistics, assess the goodness of some data and, most importantly, analyse the messages and interpretations derived from the data critically. Connolly and McGing (2006) noted that the industry requires well-grounded graduates who have developed a good balance between analytical and people skills. Students have to be educated to think critically, be analytical and creative if they are to solve problems and take decisions in a changing environment (Ring, Dickinger, & Wöber, 2009) while also being able to change the present.

The appropriacy of giving tourism students instruction in statistical literacy, understood as not only the acquisition of knowledge about tools of statistical analysis, but as the formation of statistical reasoning, is recognized. Statistics or research methods courses have consequently been included in many undergraduate tourism and hospitality curricula of universities around the world. However, as Leung, Wen, and Jiang (2018) have noted, the structure of hospitality curricula varies from country to country, due to different historical development; Statistics courses, when included, are listed as core courses in some institutions while others count them as general education courses. It is also true that, despite the relevance of acquiring statistical literacy for student's professional development, teaching and learning Statistics in a tourism or hospitality degree, or in any other Social Sciences degree, presents a big challenge: the majority of students do not have strong mathematical training, and therefore struggle with this subject. Most tourism students do not have a liking for quantitative methods (Blanco, 2004, 2008). Either due to a lack of personal interest, or because of an absence of academic aptitude, therefore, achieving statistical knowledge and competences is a difficult task for many of these individuals.

It thus becomes important to assess the level of knowledge and to find out the real difficulties that tourism students perceive when dealing with quantitative analysis: negative attitudes can often become an obstacle to effective learning (Fullerton & Umphrey, 2001); the common belief is that students' attitudes towards Statistics are negative (Wilensky, 1997). The purpose of this research is therefore to obtain a more in-depth insight into the perception of students on a degree course in Tourism, as far as their own Mathematical and Statistical skills and their degree of interest in them are concerned; the ultimate aim is to improve the processes of teaching and learning Statistics, in an effort to transmit the importance of acquiring statistical literacy, and to make it more interesting for students. To do so, a Survey of Attitudes Towards Statistics (SATS©) (Schau, 2003b; Schau, Stevens, Dauphine, & Vecchio, 1995) was used to collect the perceptions of students from the Degree in Tourism at the University of the Balearic Islands.

2. Literature review

Statistical literacy is important for society as a whole, as well as for its individual members, as they make decisions in their personal lives based on information and on some sort of risk analysis (Watson & Callingham, 2003). A student with statistical literacy should be able to interpret results and media news, and be able to ask questions about them (Sharma, 2017). The consequence of such an education should be two different types of learning outcomes: to be able to act as an educated member of a society in an information era, and to have a basic understanding of statistical terms, ideas and techniques (Rumsey, 2002).

Despite its well-known importance, there is hardly any literature about statistical literacy in the field of tourism. Only Petocz and Reid (2005) studied the issue among service students, comparing students from business, tourism, psychology, dentistry and archaeology degrees with students from a Statistics major, concluding that their views about Statistics were similar (Petocz & Reid, 2005). On the other hand, some attention has been paid to the difficulties of students undertaking research methods modules; specific studies have not been carried out in the field of tourism programs, however, although they have been done for sports programs. These latter have, to some extent, similar characteristics to Tourism students (Houghton, Williams, Jones, Page, & Bostock, 2017).

The importance of a basic statistical literacy for today's individuals, from both the personal and professional perspective, can explain the growing interest in analysing undergraduate students' attitudes towards Statistics. Other factors that justify this interest are the inclusion of Statistics in many degree programs, given its importance in scientific and technical training for many professional profiles (Comas, Martins, Nascimento, & Estrada, 2017), and the influence of students' attitudes on the learning process (Comas et al., 2017; Estrada, 2013).

Attitudes are an integral part of the learning of any educational content (Comas et al., 2017). In the teaching of Statistics, in addition to the tuition of specific contents, it is important to develop positive student attitudes, as well as new forms of reasoning. These elements are essential in fostering students' interest in completing their future learning (Batanero, 1999). According to Garfield, Hogg, Schau, and Whittinghill (2002), the desired outcomes in an introductory Statistics course are related to students' learning, persistence, and attitudes and beliefs. These outcomes "will greatly affect whether or not our students can appropriately use statistical skills, ideas, and techniques" (Carnell, 2008).

The learners' attitudes towards Statistics will influence their statistical thinking, both outside the classroom and when applying it to other courses. Positive attitudes also encourage students to take this course at a higher level (Ashaari et al., 2011; Gal, Ginsburg, & Schau, 1997); a negative attitude towards a Statistics course will, however, be an obstacle to learning the course content efficiently (Fullerton & Umphrey, 2001).

Students' attitudes influence their performance, beliefs, and behaviour in class, especially in terms of motivation and achievement

(Clark, 2013). It is unfortunately the case, however, that most students tend to believe Statistics is complicated and irrelevant to their lives (Carmona, 2004a; Carnell, 2008; Dunn, 2000; Hopkins, Hopkins, & Glass, 1996; Kirk, 2002; Laher, Israel, & Pitman, 2007; Slootmaeckers, Kerremans, & Adriaensen, 2014). In the classroom it is therefore essential to monitor and attempt to improve students' attitudes towards Statistics (Clark, 2013).

Different instruments have been developed to evaluate students' attitudes towards Statistics. The most extensively used scales are the Statistics Attitude Survey (SAS) by Roberts and Bilderback (1980), the Attitudes Toward Statistics (ATS) by Wise (1985) and the Survey of Attitudes Toward Statistics (SATS©) by Schau et al. (1995).

The SATS© is probably the best known, and indeed most validated, model on the role of attitudes in learning Statistics (Tempelaar, Van Der Loeff, & Gijselaers, 2007). Extensive work supports the reliability, validity, and multi-dimensionality of the scores and constructs (Chiesi & Primi, 2010; Coetzee & Van Der Merwe, 2010; Sorge & Schau, 2002; Tempelaar et al., 2007; Tempelaar et al., 2007; Vanhoof, Kuppens, Castro Sotos, Verschaffel, & Onghena, 2011), and researchers in Statistics education have been using this instrument to assess students' attitudes across various educational settings, interventions, and instructional approaches (Carlson & Winquist, 2011; Carnell, 2008; Dempster & McCorry, 2009; Posner, 2011). The SATS© is a seven-point Likert-type questionnaire, and it was at first composed of 28 items (SATS–28©), structured in four sub-scales for assessing four attitudes towards Statistics dimensions: value, difficulty, affect, and cognitive competence. The updated survey (SATS – 36©) includes 36 items, structured in six sub-scales for assessing six dimensions of attitudes towards Statistics: value, difficulty, interest, affect, cognitive competence, and effort.

The common belief is that the students' attitudes towards Statistics are negative, but when the measurement instruments are applied, results are not homogeneous. Some research works confirm the negative belief regarding students' attitudes – Auzmendi (1992), Garfield (1997), Wilensky (1997), for instance – but others reveal that attitudes are not so negative (Comas et al., 2017; Cuesta, Rifá, & Herrero, 2001; Estrada, 2002; Estrada, Bazán, & Aparicio, 2012; Gil; Flores, 1999; Mastracci, 2000; Mills, 2004; Nascimento, Martins, & Estrada, 2012). To our knowledge there are no studies regarding tourism students' attitudes towards Statistics, but as it is noted by Houghton et al. (2017) when analysing the relationships between research methods modules and final year dissertations in Sport and Exercise Science and Sports Therapy programmes, these types of modules have been widely criticised by both staff and students for being 'uninteresting' and 'dry' (Schutt, Blalock, Wagenaar, & Wagenaar, 1984); many students view the module as both stressful and difficult (Gladys, Nicholas, & Crispen, 2012). In this sense, Houghton et al. (2017) suggest that interventions should be considered to rectify these negative attitudes.

Most of the studies applying attitude measurement scales also analyse the relationships between attitudes and personal and academic characteristics, such as gender, academic experience in Mathematics and Statistics, age and achievement. A number of these studies reveal that the origin of attitudes comes from previous learning experiences, and from the subject's link with Mathematics (Anastasiadou, 2005; Carmona, 2004; Comas et al., 2017; Gal et al., 1997; Mills, 2004; Roldán, 2004; Schau, 2003a).

A number of authors suggest that a change in the contents and methodologies of Statistics courses is required (Baloglu & Zelhart, 2003; Bell, 2003; Bishop, Beilby, & Bowman, 1992; Cobb, 1992; Darias; Gal & Ginsburg, 1994; Ledolter, 1995; McKenzie, 1995; Mondéjar et al., 2008; Moore, 1987; Darias Morales, 2000; Mutambayi, Odeyemi, Ndege, Mjoli, & Qin, 2016; Notz & Pearl, 1993; Pineda-Roa, 2013; Prybutok, Bajgier, & Atkinson, 1991; Rhoads & Hubele, 2000; Stickels & Dobbs, 2007). Recommendations for addressing this change involve the use of teaching methodologies focused on working with real statistical data and examples, as well as on statistical thinking. Using less theory and more active learning methodologies is also suggested.

3. Methodology

The target population in this research was composed of the second year students of the Degree in Tourism in the University of the Balearic Islands. Those students enrolled on a Statistics course in the second semester (Spring semester). In 2018 the course had 120 students.

Based on the previous literature review, a self-administered questionnaire was designed, in order to achieve the research objectives mentioned above. The questionnaire had three sections. The first section contained five general questions regarding whether the student had studied Statistics previously, and asked about his/her previous perceptions, and problems they experienced when studying Statistics or Mathematics. This first section had two open questions: "How would you describe your relationship with statistical or maths subjects?" and "What are the main problems you have when studying Statistics and/or Mathematics?"; and three multiple choice questions to do with whether the student had previously studied the subject or other Statistics subjects, and about the student's previous performance in Mathematics courses. The second section included the SATS© scale items (Schau, 2003b); the third one was made up of demographic and classification questions, such as the intention to attend support classes, gender, age, field of secondary education, and employment situation.

As is well known, it is extremely important not to generate any possible influence on the students' answers to the questionnaire when information is collected through surveys, in the quest to avoid any possible bias. For that reason, it was decided to proceed with the survey on the first day of the second semester when the first session of each subject began. Half an hour before the introduction to the subject of Statistics, two researchers who were not going to be the lecturers in Statistics asked the students to answer the questionnaire. The subjects were politely asked for their collaboration and were requested to provide sincere answers. They were also informed that the procedure was going to be completely anonymous. All students present in the classroom answered the questionnaire, and a total of 83 questionnaires were obtained.

For analysis purposes, as a first step and following the indications in Schau (2003b), responses to the negatively-worded items have been reversed, in order to allow a correct interpretation of the results. Therefore, the higher the value of the items scores, the

more favourable the students' attitudes.

To analyze students' answers, a data mining technique was applied to the two open questions included at the beginning of the questionnaire, in which those replying were asked to write about their feelings and perceptions about the subject of Statistics, using their own words. For the rest of the questions, several quantitative analyses were performed. Firstly, individual items of the SATS© were analyzed, calculating their mean scores. Secondly, an Exploratory Factor Analysis (EFA) was carried out, in order to obtain the underlying components of the students' attitudes towards Statistics. Descriptive statistics for the attitudinal components yielded by the EFA were calculated. Thirdly, a reliability analysis was also performed for the attitudinal components, using Cronbach's alpha. Fourthly, differences in attitudinal component scores, which depended on students' demographic and academic characteristics, were analysed. When the Kolmogorov-Smirnov test of normality indicated that normal distribution could be assumed for the components, parametric tests (*t*-test and ANOVA) were used to test those differences. If not, non-parametric tests (Mann-Whitney *U* test and Kruskal-Walis test) were calculated.

Although the questionnaire included all the 36 items of the SATS-36 scale, for analysis purposes only the items of the SATS-28 © (Schau et al., 1995) were considered, given that some components obtained from an EFA of the SATS-36© items did not show acceptable reliability. Other research works also noted the better performance of the SATS-28. Several authors, after a revision of the evidence regarding the reliability and validity of the main attitudes towards Statistics scales, state that based on the evidence, SATS-28 seems to be the strongest of the available measures of attitudes (Clark, 2013; Emmioğlu & Capa-Aydin, 2012; Nolan, Beran, & Hecker, 2012; Sesé, Jiménez, Montaño, & Palmer, 2015).

4. Results

4.1. Description of the sample

The survey instrument was administered to second-year Tourism degree students just before they started the course, and a total of 83 questionnaires were obtained. Most of the respondents were women, 68.7%, and the average age was 21.02 years. 9.6% were repeating the subject, and 21.3% revealed that they had studied other Statistics subjects previously. Most part of the respondents were not working (42.2%) or worked sporadically (27.7%). 76.5% of the students that answered the questionnaire had been enrolled in the area of social sciences (76.5%) in their secondary education. Students who considered themselves to have a bad relationship with Statistics were a minority (9.9%), 42% considered their relationship to be good or very good; 35.8% described it as regular. Problems related to the study of Statistics seemed to be the lack of understanding (32.5% of the respondents) and inability to understand, pose, or solve, statistical problems (28.6%). Those who stated that they had no problems made up only 3.9% of the students. The majority of the respondents define their previous performance in Mathematics as within the average (60.2%).

4.2. Qualitative data analysis

Sentiment analysis was carried out into the answers of the two open questions, using specialised data mining and sentiment analysis packages in R software (tm, tidyverse, tidytext, glue and string). The steps followed were: First, the data as a corpus was loaded, second, special characters from the text were replaced and the text was cleaned removing unnecessary white spaces, stop words and the text was converted to lower case. Third, a term-document matrix containing the frequency of the words was built and then the association between common terms was analysed. The fourth step consisted of comparing sentences and words to a lexicon. As a result, the sentiment of sentences as a whole in categories of positive, negative or neutral was obtained; the comparison lexicon gives a score that runs between – 5 and 5, with negative scores indicating negative sentiment.

With regard to the first question, 50.31% (82) negative sentences were said, 25.77% (42) were neutral, and (39) 23.93% positive. The word "understands" appeared 26 times, and it was positively correlated to “problems” or “statements”. The word "grades" appeared 19 times (correlated to “good” (0.58), “high” (0.44), “bad” (0.31), “effort” (0.33), “level” (0.25), “extra” (0.23), and the word “problems” was mentioned 15 times (correlated to “understanding” (0.33), “difficulty” (0.30), “resolving” (0.35). Regarding the second question, the word “understanding” appeared 23 times and was correlated to “statements” (0.31) and “problems” (0.29). Finally, the word “problems” (14 times), correlated to “resolving” (0.35), “understanding” (0.29), “statements” (0.26) and “difficulty”, “follow”, “stress” and “practice” (0.24 respectively). These findings support the belief that attitudes towards statistical subjects are mostly negative. This is a relevant result, given the recognized effect that negative attitudes have on learning (Fullerton & Umphrey, 2001).

4.3. Assessment of attitudes towards statistics

An EFA was conducted on the SATS-28© items in order to analyse the underlying factor structure of tourism students' attitudes towards Statistics. The components that were obtained are presented in Table 1, with the factor loadings of each item, the communalities and the Cronbach's alpha for each component. The three components that were extracted accounted for 51.044% of the total variance, and all the communalities were above 0.4 (with the sole exception of items 18 and 23). Item 22 (Statistics involves massive computations) was removed from the analysis because of a very low communality (0.188). Two statistics were used to test if the factor analysis is appropriate for this study (Hair et al., 2014). First, the Kaiser-Meyer-Olkin (KMO) statistic was calculated, obtaining a value equal to 0.747, which is considered adequate. Second, Barlett's test of sphericity was conducted, in order to test the hypothesis that the correlation matrix is an identity matrix (which would indicate that the variables are unrelated and therefore

Table 1
Results of the Exploratory Factor Analysis of the SATS-28 items.

	Anxiety	Affect and self-confidence	Value	Communality	SATS-28 sub-scale
	α = 0.871	α = 0.809	α = 0.841		
21*. I am scared by statistics	0.704			0.673	Affect
27*. I will find it difficult to understand statistical concepts	0.684			0.625	Cog. Comp.
6. Statistics is a complicated subject	0.683			0.611	Difficulty
14*. I will be under stress during statistics class	0.681			0.572	Affect
3*. I will have trouble understanding statistics because of how I think	0.644			0.426	Cog. Comp.
20*. I will make a lot of math errors in statistics	0.608			0.454	Cog. Comp.
2*. I will feel insecure when I have to do statistics problems	0.605			0.402	Affect
28. Most people have to learn a new way of thinking to do statistics	0.592			0.432	Difficulty
26. Statistics is highly technical	0.564			0.421	Difficulty
11*. I will get frustrated going over statistics tests in class	0.486			0.462	Affect
18. Learning statistics requires a great deal of discipline	0.458			0.366	Difficulty
24. I will understand statistics equations		0.743		0.637	Cog. Comp.
4. Statistics formulas are easy to understand		0.719		0.663	Difficulty
15. I will enjoy taking statistics courses		0.706		0.572	Affect
1. I will like statistics		0.693		0.516	Affect
23. I can learn statistics		0.608		0.393	Cog. Comp.
9*. I will have no idea of what is going on in this statistics course		0.593		0.409	Cog. Comp.
17. Statistics is a subject quickly learned by most people		0.563		0.446	Difficulty
25*. Statistics is irrelevant in my life			0.746	0.709	Value
19*. I will have no application for statistics in my profession			0.719	0.588	Value
10*. Statistics is not useful to the typical professional			0.714	0.532	Value
12*. Statistical thinking is not applicable in my life outside my job			0.627	0.622	Value
13. I use statistics in my everyday life			0.601	0.411	Value
5*. Statistics is worthless			0.598	0.464	Value
7. Statistics should be a required part of my professional training			0.594	0.59	Value
8. Statistical skills will make me more employable			0.575	0.412	Value
16*. Statistics conclusions are rarely presented in everyday life			0.552	0.373	Value

Responses to the items indicated with an asterisk* have been reversed.

unsuitable for a factor analysis). The test statistic leads to rejecting the hypothesis. The findings of both measures therefore suggest that the factor analysis was appropriate for this study. The reliability of the total scale, measured by the Cronbach's alpha, is very good (0.904), as are the reliabilities of each component.

The first component (*anxiety*) summarizes ratings of the items related to aspects of Statistics courses that generate anxiety or stress in students, well as to the perceived difficulty of the subject. The second component (*affect and self-confidence*) covers ratings of items to do with the students' enjoyment of Statistics and their self-confidence in their capability of learning this discipline. The third (*value*) is correlated more closely with items about the usefulness, relevance, and worth of statistics in personal and professional life. The components obtained differ from the four sub-scales proposed originally by the SATS-28© (Schau et al., 1995), in line with other research papers that have also obtained different structures (see for instance Baloglu (2002), Khavenson, Orel, and Tryakshina (2012), Pan and Tang (2005); Slootmaeckers et al. (2014)). The last column of Table 1 indicates the original sub-scale of the SATS-28© in which each item was included (Affect, Cognitive Competence, Difficulty and Value). Only the third component obtained from the EFA exactly matches the sub-scale *Value* proposed originally by Schau et al. (1995).

Table 2 shows the mean scores of the sample for the items of the SATS-28©, classified with regard to the three attitudinal components obtained from the previous EFA, as well as the aggregate mean for each component. Medians are also presented. Values in Table 2 show that most of the items (16) obtain a positive mean score from the respondents (above 4, the value indicating neutrality in the 7-point Likert scale), indicating that attitudes towards Statistics are not as negative as is commonly believed, in line with the results obtained by Ashaari, Judi, Mohamed, and Tengku (2011), Beemer (2013), Bond, Perkins, and Ramirez (2012), Carnell (2008), Coetzee and Van Der Merwe (2010), Comas et al. (2017), Cuesta et al. (2001), Gil Flores (1999), Hannigan, Hegarty, and Mcgrath (2014), Mastracci (2000), Mills (2004), Nascimento et al. (2012), Stanisavljevic et al. (2014), Tempelaar, Gijselaers, and van der Loeff (2006). The majority of the items with a negative assessment (under 4, the value indicating neutrality in the 7-point Likert scale) are those related to the belief that Statistics is a difficult discipline and to the sense of insecurity that Statistics courses generate in the students. As for the aggregate components, the one with the most positive attitude on the part of the respondents is Value, followed by Affect and Self-confidence, also with a mean score greater than 4. Anxiety is the lowest-rated component. In the light of these results, it seems that students do not like Statistics, and that they consider it to be a difficult discipline. At the same time, however, they are aware of its value for their academic and professional careers, and they also see themselves capable of learning Statistics.

Table 2
Descriptive statistics for the SATS-28 items and for the EFA components.

	Mean	Median
Anxiety	**3.68**	**3.82**
3*. I will have trouble understanding statistics because of how I think	4.48	4.00
11*. I will get frustrated going over statistics tests in class	4.13	4.00
21*. I am scared by statistics	4.11	4.00
28. Most people have to learn a new way of thinking to do statistics	4.06	4.00
20*. I will make a lot of math errors in statistics	3.71	4.00
27*. I will find it difficult to understand statistical concepts	3.60	4.00
2*. I will feel insecure when I have to do statistics problems	3.48	4.00
14*. I will be under stress during statistics class	3.44	3.00
6. Statistics is a complicated subject	3.39	3.00
26. Statistics is highly technical	3.17	3.00
18. Learning statistics requires a great deal of discipline	2.91	3.00
Affect and self-confidence	**4.46**	**4.43**
23. I can learn statistics	5.83	6.00
9*. I will have no idea of what is going on in this statistics course	5.52	6.00
24. I will understand statistics equations	4.81	5.00
1. I will like statistics	4.25	4.00
15. I will enjoy taking statistics courses	3.78	4.00
4. Statistics formulas are easy to understand	3.74	4.00
17. Statistics is a subject quickly learned by most people	3.24	3.00
Value	**4.68**	**4.76**
5*. Statistics is worthless	5.76	6.00
10*. Statistics is not useful to the typical professional	5.32	5.00
16*. Statistics conclusions are rarely presented in everyday life	5.20	6.00
19*. I will have no application for statistics in my profession	4.83	5.00
25*. Statistics is irrelevant in my life	4.73	5.00
12*. Statistical thinking is not applicable in my life outside my job	4.62	5.00
8. Statistical skills will make me more employable	4.29	4.00
7. Statistics should be a required part of my professional training	4.20	4.00
13. I use statistics in my everyday life	3.13	3.00
22. Statistics involves massive computations	2.58	3.00

Responses to the items indicated with an asterisk* have been reversed.
Shaded cells indicate items with a positive students' assessment.

Responses to the items indicated with an asterisk* have been reversed.
Shaded cells indicate items with a positive students' assessment.

4.4. Students' characteristics and attitudes towards statistics

Differences in the attitudinal components depending on the following students' demographic and academic characteristics were analysed: subject repeaters (yes; no), previous Statistics courses (yes; no), gender (male, female), achievement in Mathematics (bad; quite bad; normal; quite good; very good), probability of attending support classes (7-pont Likert scale), field of secondary education (sciences, social, others), employment situation (working full-time all year; working full-time but not all year; working part-time all year; working part-time but not all year; working sporadically; without working). Also answers to the open questions previously categorized were considered: relationship with Statistics (good, no difficulty and/or low level of effort; good, medium level of difficulty, good marks, but requiring an extra effort; quite bad, high level of difficulty/complexity with extra effort to pass and/or in understanding difficulties; bad, very high level of difficulty and/or lack of understanding and/or lack of interest; others), problems related to the study of Statistics (lack of clarity in teachers' explanations; understanding and/or posing and/or solving the problems; greater involvement; lack of understanding; lack of basic knowledge; applying formulas; no problems; lack of interest; difficulties with Excel), The Kolmogorov-Smirnov test of normality indicates that for two components, Anxiety and Value, the normal distribution can be assumed. This being the case, to test the existence of differences in attitudes depending on students? characteristics,

Table 3
2-tail significance values of the tests for differences in students' attitudes components depending on demographic and academic characteristics.

	Anxiety	Affect and self-confidence	Value
Repeaters	0.200[a]	0.583[c]	0.549[a]
Previous Statistics courses	0.299[a]	0.724[c]	0.085[a] *
Gender	0.432[a]	0.076[c] *	0.477[a]
Relationship with Statistics	0.000[b] ***	0.028[d] **	0.007[b] ***
Problems related to the study of Statistics	0.064[b] *	0.154[d]	0.371[b]
Achievement in Mathematics	0.000[b] ***	0.043[d] **	0.003[b] ***
Planning to attend support classes	0.000[b] ***	0.006[d] ***	0.324[b]
Field of secondary education	0.395[b]	0.074[d] *	0.239[b]
Employment situation	0.313[b]	0.208[d]	0.038[b] **

* significant at 10%, ** significant at 5%, *** significant at 1%.
[a] *t*-test.
[b] ANOVA.
[c] Mann Whitney *U* test.
[d] Kruskal-Wallis test.

parametric tests (*t*-test and ANOVA) were used for these components; non-parametric tests (Mann-Whitney *U* test and Kruskal-Walis test) were employed for the other component, Affect and self-confidence, which cannot be considered normally distributed. Table 3 presents the significance values for these tests.

The results presented in Table 3 reveal the existence of differences in some attitudinal components depending on having completed or not other Statistics courses, gender, relationship with Statistics, problems to do with the study of Statistics, achievement in Mathematics courses, planning to attend support classes, the field of secondary education and the labour situation.

Those students who completed previous Statistics courses show a higher score for the Value component. There are significant differences in the Affect and Self-confidence component between men and women, where women have the highest average score, a result which is in line with Hannigan et al. (2014) and Stanisavljevic et al. (2014). As regards the respondents' relationship with Statistics, the better the relationship, the higher the average scores in the three components. Those students who considered that their main problem when studying Statistics is the lack of basic knowledge exhibit a much lower average score in the Anxiety component than the other students. Previous achievement in Mathematics courses turns out to be related to all three components; the better the achievement in Mathematics, the higher the scores in attitudes. This is a common result in the literature about Statistics education (Carmona, 2004a; Coetzee & Van Der Merwe, 2010; Hannigan et al., 2014; Mills, 2004), where previous experience in Mathematics is assumed to be one important source of attitudes towards Statistics (Carmona, 2004). Students revealing a higher probability of attending support classes in Statistics show lower mean scores for the Anxiety and Affect and self-confidence components. Respondents with secondary education in sciences present the highest attitudes scores in the Affect and self-confidence component.

5. Conclusions

Statistical skills are of particular importance for tourism professionals, given the vast amount of quantitative and qualitative information that is generated in this sector through the on-line platforms related to its activity, as well as to the importance of being able to analyse that data in order to make correct decisions. However, the majority of tourism students do not show any inclination towards quantitative methods. It is therefore extremely important to break down the prejudice that tourism students may have towards Statistics, making them see the relevance of acquiring a statistical literacy that reinforces and supports their critical thinking. In this process, students' attitudes towards Statistics are a key factor. In spite of the importance of the acquisition of statistical skills for future tourism professionals, it is worth mentioning that, to our knowledge, this is the first study that analyses students' attitudes towards Statistics in Tourism courses.

The analyses performed in this study identify three components of tourism students' attitudes towards Statistics: Anxiety, Affect and self-confidence and Value. Students' assessments for the components Affect and self-confidence and Value are positive, and are negative only for Anxiety, as was observed in the sentiment and quantitative analysis. Students may not like Statistics, and they consider this discipline to be complicated and very technical, but they appreciate its value for their academic and professional future, and they also consider that they are capable of learning Statistics. As has been reported in the literature review, although the common belief is that students' attitudes towards Statistics are negative, some research work has shown that, when attitudinal measurement instruments are applied, students do not reveal negative attitudes towards Statistics, at least not for all the attitudinal components. Results obtained in this research lead to similar conclusions.

The results of the qualitative data analysis, however, support the belief that attitudes towards statistical subjects are mostly negative. This finding agrees with Schau (2003a), who reports that students' spoken attitudes were actually more negative than their written responses to the SATS©. The open questions included in the survey of this study refer to the relationship with Statistics and Mathematics and to students' problems when studying these subjects. The words that arise most frequently in students' answers to these questions can be related in some way to the items contained in the attitudinal component that obtained the lowest assessment scores. This means that the findings from both the quantitative and the qualitative analysis are consistent.

The relationship between the three attitudinal components and the demographic and academic characteristics of the students was also investigated. Results show the existence of differences in attitudinal component scores depending on having completed or not other Statistics courses, as well as on gender, relationship with Statistics, problems related to the study of Statistics, previous achievement in Mathematics, intention to attend support classes, field of secondary education and employment situation.

In light of the results of this research, the most negative dimension of tourism students' attitudes towards Statistics is the one related to anxiety, this is in line with a number of research papers (Baloglu & Zelhart, 2003; Bell, 2003; Darias; Mondéjar et al., 2008; Darias Morales, 2000; Stickels & Dobbs, 2007). The efforts of the lecturer and his/her teaching action should therefore be geared at improving aspects related to this component: the aim should be to mitigate students' perception of Statistics courses as being a difficult and an "unpleasant" discipline. To undertake this task changes are required in teaching methodologies. Moving away from classes focused on the lecturer's expositions of formulas and theoretical concepts, to classes with active learning methodologies in which students work with data and real examples, with lecturer support to advise them and solve their doubts, could be a way to help the students to overcome their fear of Statistics. Future research would be required to test whether these changes could decrease the students' anxiety towards Statistics.

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Appendix A. Supplementary data

Supplementary data to this article can be found online at https://doi.org/10.1016/j.jhlste.2019.03.002.

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