PERCEPTIONS AND ATTITUDES OF TOURISM STUDENTS TOWARD STATISTICS

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Abstract

Since tourism entered in higher education, statistical skills have been frequently included in tourism curricula recognizing its importance for students training. But going further, the motivation of this paper was the conviction that tourism students need to have statistical literacy, understood not only as the acquisition of knowledge about tools of statistical analysis, but as the formation of statistical reasoning, since it is relevant for student's professional development. 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 toward Statistics are negative. This paper focuses on evaluating the attitudes of university students enrolled in Tourism management studies, using a survey administered to students of the Degree in Tourism in the University of the Balearic Islands. To our knowledge, there are no other studies of this type related to this university major, in spite of the importance of acquiring statistical skills for tourism professionals. The survey instrument includes the Survey of Attitudes Toward 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 in order to identify the underlying dimensions of tourism students' attitudes toward Statistics. The relationship between attitudinal components and the demographic and academic characteristics of students has also been investigated. From the results there emerge recommendations for teaching and learning, as well as for the improvement of attitudes toward Statistics in Tourism studies in particular, and in Social Sciences degrees in general.

Keywords: Statistical literacy, tourism curricula, students' attitudes, SATS©

1 INTRODUCTION

Frequently, tourism curricula, whether they have a more vocational or a more liberal orientation, include the learning of statistical concepts and practices or 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 critical thinking, problem-solving and decision-making, among others, which are considered indispensable (Connolly and McGing, 2006). Although the more often vocational orientation of bachelors in tourism make more emphasis on people management skills (Kokt and Strydom, 2014), this paper pretends to highlight the importance of acquiring analytical skills that go further beyond their preparation for their professional careers and build 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 must 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. Thus, it is necessary that students have a statistical literacy that complements 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 and to know where to look for it, understand reports and readings, have familiarity with basic terms and concepts of Statistics, assess the goodness of some data and, what is most important, analyse critically the messages and interpretations derived from the data. 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 to solve problems and take decisions in a changing environment (Ring, Dickinger, and Wöber, 2009) as well as being able to change the present. In this scenario, Statistics courses have been introduced in many undergraduate tourism and hospitality curricula of universities around the world. However, as Leung, Wen, and Jiang (2018) noticed,

hospitality curriculum structure varies in different countries due to the historical development, and Statistics courses, when included, are listed as core courses in some institutions while others list them as general education courses.

Despite the convenience to instruct tourism students in statistical literacy, understood not only as the acquisition of knowledge about tools of statistical analysis, but as the formation of statistical reasoning, and its relevance 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 preference for quantitative methods (Blanco, 2004, 2008). Therefore, either due to a lack of personal interest, or because of an absence of academic aptitude, the achievement of statistical knowledge and competences is a difficult task for many of these individuals.

Then, it becomes an important matter to assess the level of knowledge and 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 and Umphrey, 2001), and the common belief is that students' attitudes toward Statistics are negative (Wilensky, 1997). The purpose of this research is therefore to obtain a more in-depth insight into the perception of students from a degree 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 order to transmit the importance to acquire a statistical literacy and to make it more interesting for students. To do so, a Survey of Attitudes toward Statistics (SATS©) (Schau, 2003b; Schau et al., 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 the society as a whole as well as to their individual members, as they make decisions in their personal lives based on information and some sort of risk analysis (Watson and Callingham, 2003). A student with statistical literacy should be able to interpret results and media news, as well as to 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 nearly no 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 and Reid, 2005). On the other hand, although 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, although they have been done for sports programs whose students share, in some aspects, similar characteristics (Houghton et al, 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 toward Statistics. Other factors that can explain 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 specific contents, it is important to develop positive student attitudes, as well as new forms of reasoning, and it is essential to foster students' interest in completing their future learning (Batanero, 1999). According to Garfield et al., (2002), the desired outcomes in an introductory Statistics course are related to students' learning, persistence, and attitudes and beliefs. While learning outcomes are the ones most generally considered, the other outcomes "are also important to consider, as they will greatly affect whether or not our students can appropriately use statistical skills, ideas, and techniques. Therefore, our courses should attempt to build strong positive attitudes toward Statistics and reinforce students' use of Statistics in the real world to increase their chances of using Statistics after they leave our courses" (from Carnell (2008)).

The learners' attitudes toward 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 eta al., 2011; Gal, Ginsburg, and Schau, 1997), and a negative attitude towards a Statistics course will be an obstacle to learning the course content efficiently (Fullerton and Umphrey, 2001).

Students' attitudes influence their performance, beliefs, and behaviour in class, especially in terms of motivation and achievement (Clark, 2013). However, most students tend to believe Statistics is complicated and irrelevant to their lives (Carmona, 2004a; Carnell, 2008; Dunn, 2000; Hopkins, Hopkins, and Glass, 1996; Kirk, 2002; Laher, Israel, and Pitman, 2007; Slootmaeckers, Kerremans, and Adriaensen, 2014). Some scholars (Blalock, 1987; Garfield and Ben–Zvi, 2007) have suggested that instructors should focus more on just how valuable Statistics is, in order to foster more positive attitudes towards that subject, and suggest that as an initial step in their instruction teachers should attempt to reduce the fear of Statistics (Rhoads & Hubele, 2000).

Therefore, it is essential to monitor and attempt to improve students' attitudes towards Statistics in the classroom (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, and Gijselaers, 2007). Extensive work supports the reliability, validity, and multi-dimensionality of their scores and constructs (Chiesi and Primi, 2010; Coetzee and Van Der Merwe, 2010; Sorge and Schau, 2002; Tempelaar et al., 2007; Tempelaar et al., 2007; Vanhoof et al., 2011), and researchers in Statistics education have been using this instrument to assess students' attitudes across various educational settings, interventions, and instructional approaches (Carlson and Winquist, 2011; Carnell, 2008; Dempster and 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 toward 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 toward Statistics: value, difficulty, interest, affect, cognitive competence, and effort.

The common belief is that the students' attitudes toward 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 the attitudes are not so negative (Comas et al., 2017; Cuesta, Rifá, and Herrero, 2001; Estrada, 2002; Estrada, Bazán, and Aparicio, 2012; Gil Flores, 1999; Mastracci, 2000; Mills, 2004; Nascimento, Martins, and Estrada, 2012). To our knowledge there are not 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), and many students view the module as both stressful and difficult (Gladys, Nicholas, & Crispen, 2012). In these 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− gender (Anastasiadou, 2005; Coetzee and Van Der Merwe, 2010; Comas et al., 2017; Fullerton and Umphrey, 2001; Mills, 2004; Mohamed etal., 2012; Mutambayi et al., 2016; Pineda-Roa, 2013; Rhoads and Hubele, 2000; Ware and Chastain, 1989), academic experience in Mathematics and Statistics (Auzmendi, 1992; Carmona, 2004b; Coetzee and Van Der Merwe, 2010; Comas et al., 2017; Elmore and Vasu, 1980, 1986; Gal et al., 1997; Gil Flores, 1999; Mills, 2004; Mohamed et al., 2012; Pineda-Roa, 2013; Rhoads and Hubele, 2000; Schau, 1992; Slootmaeckers et al., 2014; Sorge and Schau, 2002), age (Coetzee and Van Der Merwe, 2010; Mutambayi et al., 2016; Pineda-Roa, 2013), and achievement (Clark, 2013; Kottke, 2000; Schau, 2003a).

Several studies reveal that the origin of attitudes comes from previous learning experiences, and from the subject's link with Mathematics (Anastasiadou, 2005; Carmona, 2004a; Comas et al., 2017; I. Gal et al., 1997; Mills, 2004; Roldán, 2004; Schau, 2003a). In this sense, a number of authors suggest a change in the contents and methodologies of Statistics courses, which would involve teaching a data-based Statistic, focusing on statistical thinking, using data and emphasizing concepts that use less theory and fewer "recipes", as well as in boosting active learning, an activity-based, application-based,

hands-on curriculum using realistic data and examples (Baloglu and Zelhart, 2003; Bell, 2003; Bishop, Beilby, and Bowman, 1992; Cobb, 1992; Darias Morales, 2000; Gal and Ginsburg, 1994; Ledolter, 1995; McKenzie, 1995; Mondéjar et al., 2008; Moore, 1987; Mutambayi et al., 2016; Notz and Pearl, 1993; Pineda-Roa, 2013; Prybutok, Bajgier, and Atkinson, 1991; Rhoads and Hubele, 2000; Stickels and Dobbs, 2007).

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 contains five general questions regarding whether the student had studied Statistics previously, and asked about his/her previous perceptions and perceived problems when studying Statistics or Mathematics. This section contains two open questions such as: How would you describe your relationship with statistical or maths subjects? or What are the main problems you have when you study Statistics and/or Mathematics?; and three multiple choice questions relating whether the student has cursed previously the subject or other Statistics subjects, and about the student's previous achievement in Mathematics courses. The second section includes the SATS© scale items (Schau, 2003b), and the third was made up of demographic and classification questions such as intention to attend support classes, gender, age, field of secondary education, and labour situation.

As is well known, when information is collected through surveys, and in the quest to avoid any possible bias, it is extremely important not to generate any possible influence on the students' answers to the questionnaire. For that reason, it was decided to proceed with the survey on the first day of the second semester when the first sessions of each subject begin. 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 asked politely 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 (Carnell, 2008; Comas et al., 2017).

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, consisting of multiple choice and Likert scale questions, descriptive and test statistics were calculated and an Exploratory Factor Analysis (EFA) of the SATS© items was conducted. Firstly, individual items of the SATS© were analyzed, calculating their mean scores. Secondly, an EFA was carried on in order to obtain the underlying components of the students' attitudes toward Statistics.Descriptive statistics for the attitudinal components yielded by the EFA were calculated. Thirdly, a reliability analysis was also carried out 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 do not show an 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 toward Statistics' scales, state that based on the evidence, SATS-28 seems to be the strongest of the available measures of attitudes (Clark, 2013; Emmioğlu and Capa-Aydin, 2012; Nolan, Beran, and Hecker, 2012). Sesé et al., (2015) report that Ramirez, Emmioğlu, and Schau (2010) encouraged researchers to use the SATS-28 due to its good psychometric properties and its congruence with the Expectancy-Value Model (Eccles et al., 1983).

4 RESULTS

4.1 Description of the sample

The survey instrument was administered to second-year Tourism degree students just before starting 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% reveal that they have attended other Statistics subjects previously. The most part of the respondents are not working (42.2%) or they work sporadically (27.7%). 76.5% of the students that respond the questionnaire cursed the secondary education in the area of social sciences (76.5%). Students who consider to have a bad relationship with Statistics are a minority (9.9%), 42% consider it is good or very good and 35.8% described it as regular. The problems relating the study of Statistics seem to be the lack of understanding (32.5% of the respondents) and understand, raise or solve the statistical problems (28.6%). Those who state that have no problems are only the 3.9% of the students. The majority of the respondents define their previous achievement in mathematics as normal (60.2%).

4.2 Qualitative data analysis

Sentiment analysis was run 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). 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 results support the belief that attitudes towards statistical subjects are mostly negative, with an ensuing effect on learning.

4.3 Assessment of attitudes toward Statistics

An EFA was conducted on the SATS-28© items in order to analyse the underlying factor structure of tourism students’ attitudes toward 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, Anderson, Tatham, and Black, 1995). First, the Kaiser-Meyer-Olkin (KMO) statistic is calculated, obtaining a value equal to 0.747 which is considered adequate. Second, Barlett’s test of sphericity is 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 unsuitable for a factor analysis). The test statistic leads to reject the hypothesis. Then, findings of both measures 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 well as the reliabilities of each component.

The first component (*anxiety*) summarizes ratings of the items related with aspects of Statistics courses that generate anxiety or stress on students and with the perceived difficulty of the subject. The second component (*affect and self-confidence*) covers ratings of items related to the students’ enjoyment of Statistics and their self-confidence on their capability for 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 works that have also obtained different structures (see for instance Baloglu (2002), Khavenson, Orel, and Tryakshina (2012), Pan and Tang (2005), Slootmaeckers et al. (2014)). In the last column of Table 1 the original sub-scale of the SATS-28© in which each item was included is indicated (Affect, Cognitive Competence, Difficulty and Value). Only the third component obtained from the EFA coincide exactly with the sub-scale *Value* proposed originally by Schau et al. (1995).

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 s 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.

Table 2 shows the mean scores of the sample for the items of the SATS-28©, classified with reference to the three attitudinal components obtained from the previous EFA, as well as the aggregate mean for each component. Confidence intervals for the mean and the median are also presented. Values in Table 2 show that the 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 toward Statistics are not as negative as it is commonly believed, in line with the results obtained by Ashaari et al. (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 larger 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.

		95% Confidence Interval for Mean		
	Mean	Lower Bound	Upper Bound	Median
Anxiety	**3,68**	**3,46**	**3,90**	**3,82**
3*. I will have trouble understanding statistics because of how I think	4,48	4,13	4,84	4,00
11*. I will get frustrated going over statistics tests in class	4,13	3,80	4,47	4,00
21*. I am scared by statistics	4,11	3,72	4,51	4,00
28. Most people have to learn a new way of thinking to do statistics	4,06	3,72	4,40	4,00
20*. I will make a lot of math errors in statistics	3,71	3,35	4,07	4,00
27*. I will find it difficult to understand statistical concepts	3,60	3,28	3,93	4,00
2*. I will feel insecure when I have to do statistics problems	3,48	3,10	3,86	4,00
14*. I will be under stress during statistics class	3,44	3,04	3,84	3,00
6. Statistics is a complicated subject	3,39	3,07	3,71	3,00
26. Statistics is highly technical	3,17	2,90	3,45	3,00
18. Learning statistics requires a great deal of discipline	2,91	2,65	3,17	3,00
Affect and self-confidence	**4,46**	**4,26**	**4,66**	**4,43**
23. I can learn statistics	5,83	5,57	6,08	6,00
9*. I will have no idea of what s going on in this statistics course	5,52	5,19	5,85	6,00
24. I will understand statistics equations	4,81	4,53	5,09	5,00
1. I will like statistics	4,25	3,93	4,56	4,00
15. I will enjoy taking statistics courses	3,78	3,45	4,11	4,00
4. Statistics formulas are easy to understand	3,74	3,47	4,02	4,00
17. Statistics is a subject quickly learned by most people	3,24	2,96	3,53	3,00
Value	**4,68**	**4,46**	**4,89**	**4,76**
5*. Statistics is worthless	5,76	5,42	6,09	6,00
10*. Statistics is not useful to the typical professional	5,32	5,02	5,61	5,00
16*. Statistics conclusions are rarely presented in everyday life	5,20	4,88	5,51	6,00
19*. I will have no application for statistics in my profession	4,83	4,49	5,17	5,00
25*. Statistics is irrelevant in my life	4,73	4,38	5,07	5,00
12*. Statistical thinking is not applicable in my life outside my job	4,62	4,25	4,99	5,00
8. Statistical skills will make me more employable	4,29	4,00	4,59	4,00
7. Statistics should be a required part of my professional training	4,20	3,90	4,50	4,00
13. I use statistics in my everyday life	3,13	2,78	3,49	3,00

22. Statistics involves massive computations	2,58	2,35	2,81	3,00

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 toward Statistics

Differences regarding students' attitudes toward Statistics components in terms of their demographic and academic characteristics were analysed.

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 student's characteristics, 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, that cannot be considered normally distributed. Table 3 presents the significance values for these tests.

Table 3. 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 relating 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]
Working?	0.313[b]	0.208[d]	0.038[b]

[a] t-test, [b] ANOVA, [c] Mann Whitney U test, [d] Kruskal-Wallis test

The results presented in Table 3 reveal the existence of differences in some attitudinal components depending on having completed 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 exhibit a higher score for the Value component. There are significant differences in the Affect and self-confidence component between men and women, women having the highest average score, 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 significantly lower average score in the Anxiety component. Previous achievement in Mathematics courses turns out to be related to all the 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 and Van Der Merwe, 2010; Hannigan et al., 2014; Mills, 2004), where previous experience in Mathematics is assumed to be one important source of attitudes toward Statistics (Carmona, 2004a). 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, and the importance of being able to analyse that data in order to make correct decisions. However, the majority of tourism students do not show an inclination for quantitative methods. It is therefore extremely important to break down the prejudice that tourism students may have towards Statistics and make them see the relevance of acquiring a statistical literacy that reinforces and supports their critical thinking. In this process, students' attitudes toward Statistics are a key factor.

Attitudes are a crucial element of the learning process. Research has shown that often negative attitudes can become an obstacle to effective learning (Fullerton and Umphrey, 2001). In the case of Statistics, the common belief of most teachers is that students' attitudes toward this field are negative (Wilensky, 1997). However, some research works have shown that when attitudinal measurement instruments are applied, students do not reveal negative attitudes toward Statistics, at least not for all the attitudinal components. Results obtained in this study are in this line. 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.

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 studyng these subjects. The words that arise most frequently in students' answers to this questions can be related in some way to the items contained in the attitudinal component that obtained the lowest assessment scores. This means that there is consistency between findings from both the quantitative and the qualitative analysis.

The relationship between the three attitudinal components and the demographic and academic characteristics of students was also investigated. Results show the existence of differences in attitudinal component scores depending on having completed other Statistics courses, 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 labour situation.

In light of the results of this work, the efforts of the lecturer and his /her teaching action should work towards improving aspects related to the component which received the lowest assessment score; the aim should be to mitigate students' perception of Statistics courses as being a difficult and "unpleasant" discipline. Therefore, lecturers are faced with the challenge of making research methods modules interesting to students (Edwards & Thatcher, 2004). In this sense, recommendations for the teaching of Statistics are directed towards focussing on statistical thinking, using data, as well as on emphasizing concepts using less theory and fewer "recipes": introducing technology is also advisable, as is working with projects, using realistic data and examples (Bishop et al., 1992; Cobb, 1992; Gal and Ginsburg, 1994; Ledolter, 1995; McKenzie, 1995; Moore, 1987; Mutambayi et al., 2016; Notz and Pearl, 1993; Prybutok et al., 1991; Rhoads and Hubele, 2000).

It is worth mentioning that, to our knowledge, this is the first study that analyses students' attitudes toward Statistics in Tourism courses, in spite of the importance of the acquisition of statistical skills for the future tourism professionals.

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